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EDITORIAL

THE MINERAL INDUSTRY IN 1920.

This issue of the "Canadian Mining Journal" contains reviews of the mining industry in each of the provinces prepared by officers of the mines departments, and a general review of the industry by Mr. John McLeish of the Mines Branch at Ottawa.

There are quite a number of phases of mining during 1930 that mark the year out of the ordinary, and provide reasons for national congratulation.

The outstanding discovery was the oil strike at Fort Norman, a find of major significance and importance. The presence of nickel-copper ore, of Sudbury type, with high percentages of platinum contents near Lac du Bonnet, Man., and the definite prospect of the mining of the Flin Flon ore body, are two additional circumstances of good import. The silver-galena area near Mayo City in the Yukon Territory is one of which most encouraging reports are heard. The gold-bearing rocks of Northern Ontario are, at the end of 1920, determined to be greater in extent and in depth than was previously definitely known. The economic importance of the Gaspé zinc area has been confirmed by explorations during 1920. The coal areas of Alberta have, during 1920, undergone economic discovery, a process not less necessary to their utilization than their physical discovery. By working its coal areas Canada has found 2½ million tons of coal during 1920, which, being interpreted, is better than a $25,000,000 shipment of gold from Canada to New York.

All these are items of solid comfort, of permanence, and provide substantial foundations for reasoned optimism.

The world outlook is not good, but it is better than it was a year ago. Some of the nations of Europe have not returned to sanity, but others have shown signs of greater stability than was generally hoped for in January 1920, and there has been much recuperation. We are not disinterested, because on a continuance of the process of recovery from war sickness in Europe and Asia, depends the course of our trade.

We have some of the things the world needs most. We have civic peace, stable government and no ethnological divisions that need worry us. We have land, and elbow room, and none of the drawbacks of national senescence. We have food, gold and fuel, for ourselves and the outside world. Some of the things we have in abundance that no other nation possesses except in small quantities, as asbestos, nickel and mica. On these things Canada may stand, not unruffled, but unendangered by the winds from Russia or other centres of social collapse.

A mineral production of two hundred millions of dollars in value in 1920, second only to our very best mineral year, is good news at this season, and substantial encouragement to hope for better things in 1921.

NEW GOLD NEEDED FROM CANADIAN MINES

"Chemical Engineering & Mining Review," of Melbourne, Australia, writing on the production of gold, remarks:

"Who can doubt that the British Government would "welcome above everything a fresh source of gold "supply within the Empire? If another Kalgoorlie or "a second Klondike could be found, the whole world "would respond."

This whole hearted advocacy of the necessity to produce coal within the Empire, for its general financial strengthening and the restoration of British exchanges, is confirmation from a mining authority of excellent standing in another British Dominion of the view recently expressed in the "Canadian Mining Journal" that the increase of gold production in Canada had assumed the aspect of a pressing national duty. The measure of that necessity is the premium on New York funds, which would not exist were Canada able to mine sufficient gold to pay its trade balances in specie.

The Canadian viewpoint on gold production is largely coloured by the reflection of the problem of gold production in the United States, a problem quite analogous to our own. The bankers of the United States [illegible] upon increased gold production in this country [illegible] talk of a glut of gold. That is their problem. Its difficulty consists in the scarcity of gold. The [illegible]

that have hindered gold production in the United States, it is true, are the same causes that have hindered gold production in Canada, but the effects of restricted gold output are very different in our case.

Whether we have unworked goldfields in Canada comparable to the Klondike cannot be stated, but that such mines as the Porcupine and Kirkland Lake districts can show are singular and lone examples in the vast expanse of potential gold-bearing rocks that surround them on every side does not seem likely.

If gold-mining in Canada should become more profitable through the decreased cost of materials and lowered costs of living, as seems probable, it should enable not only greater outputs from the favorably situated mines of Northern Ontario, but the opening of closed mines in British Columbia and maybe Nova Scotia, although that province's gold contribution is now almost disappeared.

It would be an interesting speculation to calculate what our exchange rate on New York would be today without the new gold produced from Canadian mines, but it would be a much more interesting and profitable occupation for our national leaders to consider ways and means of largely increasing gold production in Canada.

ONTARIO METAL MINES IN 1921.

Ontario metal mines in the year just closing made fairly good records. During the early part of the year shortage of labor retarded operations considerably and at the close a shortage of water power is acting in a similar way. Falling prices of metals and difficulty in selling some of the metals at even low prices, has resulted in considerable curtailment of production during the last quarter. There is a good deal of uncertainty as to the immediate future. The scarcity of water is bound to interfere seriously with production during the first quarter of 1921. The poor market for nickel and copper is also likely to affect Sudbury mines for some months. The spring rains will bring relief to the gold producers and enable them to greatly increase output and make a good showing before the year is far advanced; but until the rains come the producers will have no opportunity of taking advantage of the favorable turn in conditions. The Sudbury mines will probably show quick return to normal activity when metal manufacturing comes back to life. Some of the silver mining companies will be hampered by lack of power for a few months, but should make up for it before the year is over, others will find it unprofitable to carry on some of their operations unless the price of silver is fairly high.

It is difficult to make predictions as to Ontario's probable metal output during the coming year. The gold miner sees a bright future and expects a busy year and there can be little doubt that gold mining will make good headway now. The shortage of power, however, prevents the operators from being very enthusiastic about the records they expect to make during the balance of the winter. The nickel-copper mine operators are evidently dependent on a general resumption in manufacturing, and if the optimists are right this will come in a few months. The silver mine operators are affected by events in the Far East that it is difficult to get reliable information about. At present prices some of the silver mines will doubtless make fairly large production during the year. At lower prices some of the companies will find operating at a profit a difficult matter.

The outlook for 1921 for metal mining in Ontario is, therefore, not a very clear one and predictions are not worth much. It is a time when little will be done by those who are afraid to venture when business is dull and the clouds still obscuring the view. The metal output during 1921 will to a larger extent than usual depend on the ability of operators to see ahead and form judgments as to when courage will displace fear in the business world. In a falling market it is difficult to judge when the bottom is nearly reached and the upturn at hand. If Canadian industries as a whole make a good record in 1921, the mines will do so. In any event the gold mines should do well.—R. E. H.

COAL PRICES.

Bituminous coal in the United States has a decided downward trend, and in Pennsylvania districts prices have fallen to from $3.25 to $3.75 per ton at the pit mouth, an entirely unremunerative figure at present wage rates. A number of bituminous mines have closed down, and the situation is chiefly affecting the small mines. These mines have benefitted greatly from recent scarcity of coal (or it is more correct to say defective distribution of coal) and high prices, and they will not continue operations when they become unremunerative. The larger companies, however, will have to keep organizations together, and their producing costs will benefit by the closing of competitive small mines and the better attendance of workmen which will result.

The slackness of demand for bituminous coal is largely a result of slowing up of steel making operations, and smaller amount of coal being made. Export business is also falling off because, no matter how badly Europe needs coal, she is unable to pay for it, and the mines of France, Belgium and Germany are beginning to approach to pre-war production of coal. British mines are also, in face of impending unemployment, showing much larger outputs.

A price of $3.50 per ton at the pit mouth would appear to be that below which bituminous coal cannot be produced in the United States profitably so long as existing wage rates and hours persist. Any decided reduction in production during the coming winter will result in shortage and higher prices in the Spring.

The reflex of the situation in the United States is being now felt in Nova Scotia, and a reduced number of working days at the collieries there is now impending and has actually taken place in some instances.

Canada's Mineral Production in 1920

By JOHN McLEISH *

As the year draws to a close the evidence of economic depression, falling prices, restriction, or complete cessation of operation at numerous points grows in strength, tends to monopolize public attention and to develop a general feeling of lack of confidence. Yet the changes effected are exactly those which the public not only expected but demanded, though no doubt it was hoped they might be brought about with less industrial disruption.

As a matter of fact Canada's mining industry during 1920 has in the aggregate had a most successful year and has furnished an output the value of which has been exceeded only once in its history, viz: by the high value of the war production of 1918.

The effect of the year end price decline on the years mineral output has really been of small proportion. It is not the purpose of this article to discuss its probable effect throughout the coming year but the hope may be expressed that it will rapidly be followed by an industrial activity based upon more healthy conditions of price and profit. While Canada has her domestic problems in respect to supplies of iron and petroleum and distribution of coal, the great basic factors of her enormous mineralized areas, her great known resources in coal, nickel, copper, gold, zinc, asbestos, and other metals and products too numerous to specify, and her infinitely greater latent possibilities should never be lost sight of. These will continue to form the basis of industry and of national development ever growing in extent and accelerated with increasing knowledge of better methods of recovery and use.

Under the stimulus of war's demands, Canada's mineral production increased from a total value of $128,863,000 in 1914 to a value of $211,300,000 in 1918.

The reaction in 1919 resulted in a falling off to $176,686,000, practically the same value as was placed upon the 1916 production. For 1920 a broad survey of the probable production indicates a total value of not less than $200,000,000, a production exceeded only by that of the maximum year 1918.

During the past seven years the annual totals have been:—

	Metallic.	Non-Metallic	Total value of Production.
1914	$ 50,386,619	$ 69,476,456	$128,863,075
1915	75,814,841	61,294,330	137,109,171
1916	106,319,365	70,882,169	177,201,534
1917	106,455,147	83,191,674	189,646,821
1918	114,549,152	96,752,745	211,301,897
1919	73,262,793	103,423,507	176,686,390
1920	80,000,000	120,000,000	200,000,000

The year of 1920 has shown a quick recovery in the production of copper, nickel and zinc amongst the metals and in the production of coal and many other non-metallic products. Gold production has continued to increase during each of the past two years, though the increment has been very small, and Canada occupies an almost unique position in being perhaps the only gold producing country which has not shown a serious falling off in the production of this metal. In the production of zinc, asbestos and coal the highest pinnacle of production has been reached during the year just closed. True it is, that some products such as graphite, magnesite and pyrites have not been in strong demand. On the other hand the production of chromite, gypsum, fluorspar, mica and salt have been well maintained while there has been an unusually good demand and considerably increased production of feldspar.

Shortage of fuel throughout the greater part of the year in Central Canada and insufficient transportation facilities have tended to restrict shipments. The production of lime and cement was seriously affected by the fuel shortage while car shortage restricted, or hampered the shipments of coal, asbestos, feldspar, and other products. In many camps labour was none too plentiful and wages for the most part were maintained at the highest levels.

It is probable that in the production of metals the recovery to higher output levels has been too rapid. With the exception of silver, metal prices were well maintain throughout the first nine months of the year, copper holding during this period at slightly above the average of the previous year, lead at about 50 per cent above the average of 1919 and zinc at 30 per cent in excess of the previous year's average.

Toward the end of the year, however, market conditions appeared to indicate the accumulation of excessive stocks, and the crash in metal prices during October, November and December showed the desire of holders to unload. The fall in silver price began in January and was accelerated in October.

The severe price decline has resulted in the recent closing of a number of mining operations with the consequent labour unemployment involved. Some of these must perforce remain closed or work at part capacity until exhaustion of accumulated stocks restores the market demand, or higher prices, or until the operators are able to reduce costs of production to the point of successfully meeting prevailing prices.

Copper and Nickel.

These metals in Ontario are derived chiefly from the great deposits of copper and nickel sulphides found in the Sudbury district, the production of nickel being supplemented by a small recovery from the silver ores of the Cobalt district. There is no nickel production in other provinces. Copper, is, on the other hand, recovered from pyrites, or sulphur ores in Quebec, and from a variety of complex ores mainly sulphides usually carrying some values in gold and silver in Manitoba, British Columbia and the Yukon.

The total production of nickel from all sources in 1920 is estimated at 61,500,000 pounds, an increase of 38 per cent over the 1919 production, and an output that has been exceeded only during the four war years 1915 to 1918 inclusive. The annual production of this metal in Canada for some years to come will be limited only by the demand on the market. Canada has been the principal source of supply for the world's markets. The developed deposits assure an output for many years and smelting capacity has been constructed considerably in excess of the highest production reached during the war which was 53,000,000 pounds in 1918. The company by the name of America Nickel Corporation of the

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ton and the refinery at Dechênes, Quebec, the former having been placed in operation about January 18 and the latter in April has contributed materially to the increased output during the year. During the last two months of the year the International Nickel Co. of Canada, Ltd., effected a 25 per cent reduction in output both at the Copper Cliff smelter and at the Port Colborne refinery.

The average price of nickel in New York was quoted throughout the year at 45 cents. In London the price per gross ton rose from £215 in January to a maximum of £230 which held from March 15 to November 19. On December 10 price quoted was £215.

The production of copper is estimated at 82,500,000 pounds which compared with a production of 75,000,000 pounds in 1919 shows an increase of 10 per cent. The highest previous production was 118,769,000 pounds in 1918.

The production in 1919 included 2,691,695 pounds from Quebec; 24,346,623 pounds from Ontario; 3,348,000 pounds from Manitoba; 44,502,079 pounds from British Columbia, and 165,184 pounds from the Yukon district. The production from Quebec in 1920 has been less than half that of the previous year, the Eustis mine and mill having been idle throughout the year. In Ontario the production has been increased about 25 per cent. The Manitoba shipments from the Mandy mine were about the same tonnage as the previous year. In British Columbia a slightly increased production seems to have been derived from the Coast mines. The new mill of the Canada Copper Corporation erected to treat the Copper Mountain ores was not placed in operation till October and announcement has recently been made that the low price of copper has compelled its closing down. This mine, therefore, made but a small contribution to the year's production, which, as usual, was obtained chiefly from the Anyox, Britannia and Rossland mines.

The average price of copper during the year was only fractionally less than the average of 18.69 cents in 1919 though from September to the end of the year the price has dropped from 18.5 cents to 13.25 cents.

Gold and Silver.

The value of the gold production is estimated in round numbers at $16,000,000, as compared with $15,850,423 in 1919. While the total value has shown slight increases during the past two years, the production is still less than that obtained in 1916 when the total was over $19,000,000, or in 1900 when a maximum of nearly $28,000,000 was obtained.

In 1919 the production included: $1,875,039 from the Yukon District; $3,457,406 from British Columbia and $10,454,553 from Ontario; with smaller amounts from Manitoba, Quebec and Nova Scotia. The Province of Ontario contributed nearly 66 per cent of the total. In 1920 the Yukon production which has been steadily declining shows a further decrease of about 30 per cent. British Columbia's production is also believed to have declined about 20 per cent, though estimates from this Province at this time are based largely on conjecture.

The alluvial workings are believed to have made about the same output as during the previous year, but the closing down of the Hedley mine in the Osoyoos District eliminated for the time being one of the most important producing mines. The other principal sources of gold in this Province are the gold-copper ores of Rossland, Anyox and of the Surf-Inlet mine in the Skeena District. The development of the Premier mine in the Salmon river area, Portland Canal Division at which a large cyanide mill is under construction will provide a new and important source of this metal. The production in Ontario, on the other hand has been increased at least 10 per cent or sufficient to just a little more than balance the decrease in other provinces.

Ontario has probably contributed about 72 per cent of the total Canadian gold production in 1920 derived from seven mines in the Porcupine District, three at Kirkland Lake and several miscellaneous properties.

Nova Scotia, Quebec and Manitoba are at present the minor contributors to the country's gold production. Nova Scotia for many years boasted an annual production exceeding $500,000 but in 1920 less than $15,000 is reported to have been obtained. Some spectacular gold finds have been made in Manitoba but the copper ores of the Mandy mine have up to the present been the principal source of the gold produced. The development of the Flin-Flon may in a few years provide quite an important source of gold as a by-product.

Falling prices in commodities and a more plentiful supply of labour will furnish a great stimulus to gold mining.

Silver production continues to decline, the estimated output in 1920 being 13,500,000 ounces as against 16,020,000 ounces in 1919. The 1919 production included 12,117,878 ounces from Ontario; 3,713,537 ounces from British Columbia; 140,926 ounces from Quebec; and small quantities from Manitoba and the Yukon. There appears to have been a general decrease from all sources in 1920. The Ontario production estimated at about 10,500,000 ounces the falling off being due in part to power shortage. The rapid decline in the price of silver beginning in January also tended to diminish output particularly toward the end of the year. The average price of silver increased from $1.31 on January 3rd to $1.35 on January 17, then rapidly fell to $1.21 on March 20 and 99 cents on May 22. During the next four months the change was slight but in December the price had fallen to 65 cents.

Silver production in British Columbia has been mainly a by-product recovered from the treatment of lead, copper and gold ores. The opening up of high-grade silver ores such as those found in the Dolly Varden mine at Alice Arm, B.C., gives promise of greater production in the future. The silver-lead ores of the Mayo District, Yukon Territory are also attracting considerable attention, high grade ores having been found over a considerable area in this District.

Lead and Zinc.

While British Columbia is the principal source of lead and zinc production, these metals have also been obtained in important quantities in Ontario and Quebec.

The production of lead in 1919 including lead bullion and lead recovered from ores exported, was 43,827,699 pounds, of which 40,060,113 pounds were obtained in British Columbia; 1,487,586 pounds in Ontario, and 2,280,000 pounds in Quebec.

During 1920 there has been a considerable falling off in the quantities of lead ores exported to the United States from British Columbia. Shipments from Quebec were about one third those of the previous year, while Ontario's contribution has probably been increased by over 50 per cent. The total production during the year is roughly estimated at 35,500,000 pounds.

Lead prices during the greater part of the year aver-

aged considerably higher than in 1919. A price of from 8 to 10 cents was quoted until September, as against an average of 6.966 cents in 1919. In December, however, the price in New York had fallen to 5 cents.

Zinc ores were again shipped from Notre Dame des Anges in Quebec, though the main production has been derived from the Sullivan and other smaller properties in British Columbia. The zinc reduction plant and refinery at Trail has operated steadily with increased production.

The total production from all sources in 1919 of refined zinc and zinc recovered from ores exported was 32,194,707 pounds, of which 30,295,015 were obtained in British Columbia. It is estimated that the 1920 production has been not less than 42,000,000 pounds. With zinc also there has been a distinct falling off in exports of ore to United States smelters.

The price of zinc was well maintained during the first nine months of the year, though with other metals it fell off at the end of the year. Quotations at St. Louis were 9 cents in January; 8 cents in May; 7 cents in November and 6 cents in December.

Iron and Steel.

The shipments of iron ore from Canadian mines in 1919 amounting to 197,170 short tons, were the lowest that had been recorded in 19 years. Production in 1920 has made a new low record, the total shipments according to preliminary estimates not having exceeded 120,000 tons, and were derived mainly from the ore mined by the Algoma Steel Corporation at Magpie Mine and Moose Mountain, Ltd., at Sellwood, Ontario.

The shipments from both mines consist of a beneficiated product, roasted or nodulized siderite from the Magpie and briquettes from concentrated magnitites at Moose Mountain.

The total production of pig-iron from blast furnaces and electric furnaces in 1920 is estimated at 1,080,000 short tons and the total production of steel ingots and steel castings at 1,220,000 short tons, both records showing a substantial increase over the production of the previous year.

In 1919 the production of pig-iron was 917,781 short tons of which 910,080 tons were made in blast furnaces and 7,701 tons were made in electric furnaces from scrap steel.

The total production of steel ingots and direct steel castings in 1919 was 1,030,342 short tons of which 993,039 tons were ingots and 37,303 tons direct steel castings. The total production included open hearth steel 1,007,495 tons; electric steel 15,502 tons; crucible and converter steel 7,345 tons.

During 1920 the blast furnace plants at Sydney and North Sydney N.S. were active throughout the first ten months but were closed down at the end of November. One furnace of the Dominion Iron & Steel Co., at Sydney was blown in on December 10. The furnace plants at Hamilton, Port Colborne and Sault Ste. Marie, Ontario were active throughout the year.

The blast furnace plants at Midland, Parry Sound, Deseronto, and Port Arthur, Ontario, were idle throughout the year.

Asbestos.

The major part of Canada's asbestos production is exported and the export records for the first nine months of the year indicate a productive activity during 1920 between 20 and 30 per cent greater than the previous year, and this result has been achieved notwithstanding car shortage and other adverse factors. The total shipments in 1919 included 136,765 tons of asbestos fibre and 22,471 tons of "Asbestic", having an aggregate value of $10,975,000. All the mines have been very active. Extensive alterations and improvements in equipment have been made at many properties. Much prospecting by diamond drilling has been undertaken on several of the older properties resulting in the development of resources sufficient to assure many years operation. Prospecting for new deposits has also been exceedingly active not only in the Black Lake, Thetford, and other areas of the Eastern Townships, which are the main centres of production, but the asbestos areas of the Porcupine District in Northern Ontario and those in Low Township, Wright county, Quebec have also received attention.

Coal.

Notwithstanding the difficulties encountered in respect to car shortage and the high wage cost of mining coal production during 1920 has exceeded that obtained in any previous year.

Monthly statistics of production have been collected by the Dominion Bureau of Statistics and on the basis of a nine months record it is estimated that the total production for the year has been not less than 16,000,000 short tons and may have reached 150,000 tons in excess of this figure. This production shows an increase of nearly 2,500,000 tons, or about 18 per cent over that of the previous year.

The production in 1919 reached a total of 13,681,218 short tons and by provinces included: Nova Scotia 5,720,373 tons; New Brunswick 179,108 tons; Saskatchewan 380,169 tons; Alberta 4,964,535 tons; British Columbia 2,435,933 tons; and the Yukon District 1,100 tons.

It is estimated that the Nova Scotia production has been increased in 1920 by from 450,000 to 500,000 tons. The production in New Brunswick and in Saskatchewan which is small in the aggregate has been less than in the previous year. Alberta's production has increased to a total not far short of 6,750,000 tons, and that of British Columbia to about 2,800,000 short tons.

Although Alberta has reached its highest production in 1920 that of Nova Scotia and British Columbia is still below the records of former years, Nova Scotia having produced 7,980,073 tons in 1913 and British Columbia 3,330,745 tons in 1910.

CHANGES IN EXECUTIVE CANADIAN COLLIERIES (DUNSMUIR) LTD.

Recent changes in the executive management of the Canadian Collieries (Dunsmuir) Limited have been announced. Henry S. Fleming, of New York City, who for several years has been chairman of the executive committee has resigned as president of the company and allied organizations. It is stated that the board of directors and the bondholders' committee have decided that executive management shall in future be centered wholly in British Columbia, With J. M. Sayward of Victoria, B.C., who is continued in the office of general manager, at the head of the executive with a seat on the board, he also becoming president of the Western Canada Comox branch of the company's organization, with F. Perry, of Montreal, Quebec, vice president of the Canadian Collieries, as vice president. Thomas Graham of Cumberland, Vancouver Island, remains general superintendent for the company.

Ontario's Mineral Industry in 1920

By W. R. ROGERS.*

Statistics of metalliferous production during the first 9 months of the year as collected and published by the Ontario Department of Mines, provide a basis of calculation of output for the full year. These figures, however, cannot be used pro rata, working conditions and prices during the last quarter of the year having changed materially.

The expected period of deflation following the war manifested itself during the closing quarter of the year in so far as general commodities are concerned. In the case of silver the decline in price has been more gradual—a reflection of world market conditions. If the high scale of prices for materials, which had been reached gradually, declines in like manner, no serious business consequences need be feared. Artificial bolstering of prices finally had to give way to world-wide economic conditions.

With the exception of the last quarter of the year there was a shortage of labour at the mines of the province. Gold mines were particularly hard hit for mining costs were at the peak, while the price of the marketable product remained constant. Just as labour was becoming more plentiful in the fall of the year a shortage of hydro electric power set in, precluding the possibility of utilizing this increase in man power in both gold and silver camps. Power shortage, due to scanty precipitation during the late summer and fall, may continue until spring. At Porcupine, Kirkland Lake and Cobalt auxiliary steam plants are being utilized as far as possible. For the silver mines this combination of low prices for silver and a power shortage is particularly serious and a marked reduction in output may be expected until operating conditions improve.

Following is a condensed record of Ontario's mineral output for 1919, with an estimate of production for 1920:

Ontario's Mineral Production in 1920.

Product.	Value of output, 1919.	Estimated Value, 1920.
Gold	10,451,709	11,000,000
Silver	12,904,312	9,800,000
Nickel	11,971,931	13,500,000
Copper	3,709,687	4,000,000
Cobalt	1,009,479	1,600,000
Pig Iron from Domestic Ore	1,200,793	1,800,000
Miscellaneous metallics	342,848	540,000
Total metallic	41,590,759	42,300,000
Non-metallic minerals and structural materials	17,293,157	18,700,000
Grand total	58,883,916	61,000,000

Silver-Cobalt.

The output from the silver-cobalt mines of the Cobalt area continues to be satisfactorily maintained considering the fact that the camp has been producing for 17 years. For the first nine months of the year silver marketed exceeded the figures for 1919 both in quantity and value. Power shortage in the last quarter of the year and a rapid decline in the price of silver will doubtless reduce the figures for the full year below those for 1919. Towards the close of the year labour became more plentiful and consequently more efficient. The system of paying a bonus above a base wage, depending on the market price of silver, has been abandoned. It worked well for the miners when prices advanced, but complaints were frequent when the market declined. Before the war $3.50 per day was the standard wage for miners. At present the rate is $5.75 per day. On December 10 the low price of silver for the year was reached, 59¼ cents per ounce. In 1919 the Nipissing company produced silver for 37 cents per ounce, but the cost to a number of other operators was as high as 65 cents per ounce. It should be pointed out, however, that the producer gets the benefit of the exchange situation as between Canada and the United States, and for the greater part of the year this served to offset the New York price of $1.00 per ounce paid for domestic silver by the U. S. Government under the Pittman Act.

Developments during the year at Gowganda on the Castle property of the Trethewey company were encouraging. Work was in progress on several other claims. Excessive costs, however, hampered operations. Lack of railway facilities is also a factor in preventing this silver camp from reaching its development. In South Lorrain considerable ore was mined and a mill completed by the Keeley Silver Mines, Ltd.

One feature worthy of note was the high price of cobalt until near the close of the year, when commodity prices in general suffered a big slump.

Gold.

In 1920 Ontario's production of gold exceeded that of silver in value, for the first year since 1903, when Cobalt became a silver producer. It speaks well for the gold mining industry, which prior to the discovery of Porcupine in 1909 was small, that this position has been attained despite constantly increasing production costs during the war period. Gold mining in Ontario does not require the stimulus of a McFadden bill, as proposed in the United States, which aims to artificially bolster up a languishing industry by providing a bonus of $10 per ounce for new gold produced. In spite of adverse conditions Canada increased her gold output in 1919 and was the only country in the world to do so, thanks to Ontario's contribution of $10,451,709 or 66 per cent of the total. The estimated output for 1920 added to the previous production gives a total of $64,000,000 for the Porcupine gold area. During 1920 the following Porcupine mines were producers, Hollinger Consolidated, McIntyre, Dome, Northerown, Dome Lake and Davidson Consolidated. The first mentioned is sometimes referred to as the "wonder mine of Canada." Its record justifies the epithet. For the years 1911 to 1919 inclusive, from 3,240,758 tons of ore milled values to the extent of $32,202,921 were recovered. Dividends paid during the same period total $11,146,000. Hollinger ore reserves stand at approximately $40,000,000. Labour shortage in the earlier part of 1920 prevented a larger output, while power shortage had the same effect during the last qauter of the year. As operating conditions improve, the present producers will increase their capacity and other mines are expected to recommence. In the

*Statistician, Ontario Department of Mines.

latter category the Porcupine V.N.T. and Schumacher are included. Similar conditions exist at Kirkland Lake. The Lake Shore, Kirkland Lake and Teck-Hughes mines produced gold to the value of $769.069 during the first nine months of the year. The total output from the Kirkland Lake area up to the end of 1920 will approximate $4.000.000. Wright-Hargreaves is ready to produce as soon as power is available, while Tough-Oakes and possibly Ontario-Kirkland will become producers before the end of 1921.

Ore has been proven to the 925 ft. on the Kirkland Lake property and at the Lake Shore the development program calls for sinking a three compartment shaft to the 800 ft. level. Already a depth of 600 ft. has been reached and lateral development started. Miscellaneous mines with an output during the year include Argonaut Gold, Limited, in the township of Gauthier, Contact Bay Mines, near Dryden, W. E. Stone, of Mine Centre, and W. S. Jackson, of Schreiber.

Northern Ontario is regarded as the most promising gold field in America. If the undiscovered gold areas await the prospector, and we have every reason to believe that such is the case, it is of the utmost importance to the mining industry that well-trained and intelligent prospectors should thoroughly investigate all promising territory. Throughout the winter the Ontario Department of Mines purposes conducting prospectors classes at various mining centres. Dr. W. L. Goodwin, formerly Dean of the Science of Faculty of Queen's University, is in charge of this work. Great interest has been manifested and the hope is entertained that good results will follow the instruction provided. The first class was held in December at Madoc, where some 40 to 50 prospectors and others interested availed themselves of the provileges.

Dividends and Bonuses.

In the final analysis the most important question is, does mining pay? Capital is not interested in creating new wealth unless there is an adequate return on the investment. The following is an official record of dividends paid by silver and gild mining companies in 1919, with comparative unofficial figures for the year 1920.

Silver Mines.

	1919.	1920.
Coniages	$ 400.000	$ 400 000
*Kerr Lake	337.000	75 000
McKinley-Darragh	269.723	269.723
Mining Corporation	622.519	653.119
Nipissing	1,845 000	1,800 000
Trethewey	50.000	. . .
Beaver	. . . .	60.000
Total.	$3.521.212	$3,358.142

*Kerr Lake made a reduction in capital in 1919 of $600 000, and Buffalo $350.000. This disbursements of assets is not included in the dividend figures.

Gold Mines.

Hollinger Consolidated	$1.722.000	$2.214.000
McIntyre Porcupine	364.028	546,042
Dome Mines		400.000
Lake Shore	100.000	80.000
Total	$2,186,028	$3,240,042

Dividends and bonuses paid to the end of 1919 amounted to $78,335,943 for silver mining companies, and $15,545.238 for gold mining companies, a remarkable record.

Nickel-Copper and Metals of the Platinum Group.

Ontario for many years has supplied the major part of the nickel of the world. During the war period production was greatly increased, 1.559,892 tons of ore having been melted in 1918 the maximum year of production. Ore smelted in 1919 was 754.567 tons, placing the industry on practically a pre-war basis. For the first nine months of 1920 at Copper Cliff, Coniston and Nickelton 809.022 tons of ore were smelted. During the last quarter of the year, however the market for nickel and copper has been dull and stocks have accumulated. In consequence the International Nickel Company of Canada curtailed its output by 25 per cent on November 1st, which reduces production to 3 000 tons per month of bessemer (nickel -copper) matte and 400 tons of refined nickel. A further reduction in output has since come into effect.

Early in the year the new smelter of the British America Nickel Corporation at Nickelton was put in blast, and the resulting Bessemer matte, produced without preliminary roasting of ore, was shipped to the new electrolytic refinery of the Corporation at Deschenes, near Ottawa. Both smelter and refinery are reported to be operating satisfactorily. Electrolytic nickel and copper are being turned out, although no slimes have yet been treated for the recovery of silver, gold and metals of the platinum group.

The International Company's refinery at Port Colborne which began operating in July 1918, recovers the platinum metals in impure form. Definite figures have not been available until recently to show what recovery is made by the Mond Nickel Company, which formerly sold its precious metal slimes to Johnson, Matthey and Company, of London, but has now installled a plant at Clydach Wales, for making its own recoveries. A bulletin on Platinum recently issued by the Imperial Institute of London, states that for the years 1916-1918 inclusive from the Mond company mattes there was a recovery of 1.399 ounces of platinum. In 1915 residues disposed of by the Mond company were estimated to contain 3 078 ounces of platinum 5.174 ounces of palladium and 917 ounces of iridium and rhodium. In 1919 from matte produced by the International company there was a recovery at Port Colborne, Ontario and Bayonne N.J., of 1.770 ounces of platinum metals, of which 642 ounces were platinum, 812 palladium, while rhodium, osmium, iridium and ruthenium made up the balance. These figures indicate that Ontario is an important producer of platinum, ranking third among the nations of the world, Russia and Colombia being the first two.

Despite the temporary dullness in the nickel market it should be noted that the use of "Monel" metal, a nickel-copper alloy produced by the International company is rapidly expanding. Its toughness and non-corrosive properties open [illegible] field of uses. Nickel [illegible] France and Italy, while recently Chile [illegible] Paris for [illegible]

Iron Ore, Pig Iron and Coke

Only two companies [illegible] during the year, namely [illegible]

Moose Mountain, Limited. The former worked a siderite deposit in the Michipicoten area known as the Magpie. Operations by Moose Mountain on their magnetite ore body at Sellwood were greatly curtailed towards the close of the year. Both ores require beneficiation, the siderite being sintered and nodulized while the magnetite is briquetted. During the first nine months of the year 135,023 short tons of ore were mined. Development by the Algoma Steel Corporation of an immense body of siderite ore are near Michipicoten Harbour, known as the New Helen, has been indefinitely postponed, owing to excessive construction costs for the necessary plant.

Figures of Canadian production of pig iron for the first 9 months of 1920, as published by the Federal Department of Mines, indicate that, after a decline in 1919, the output is getting back to the figures of war years. The average output for the period was 89,610 tons per month. Ontario's contribution averaged 56,951 tons per month for the nine months. It should be noted, however, that only 9.64 per cent of the ore smelted in Ontario was of domestic origin. Blast furnaces were in operation during the year at Sault Ste. Marie, Hamilton, Port Colborne and Midland.

Both the Algoma Steel Corporation at Sault Ste. Marie and the Steel Company of Canada at Hamilton operate by-product coke ovens to meet their coke requirements. The "by-product" oven possesses two great advantages over the old style "beehive," namely a greater yield of coke and the recovery of by-products. These latter include sulphate of ammonia gas, tar, benzol, toluol and other oils. In the latter part of September the Steel Company of Canada commenced operating their new benzol plant for recovering light oils. In December 100 coke ovens were in operation, using 1,250 tons of coal daily and permitting a production of benzol by-products of approximately 100,000 U. S. gallons per month. Benzol, motor fuel, toluol and solvent naphtha can be produced in various proportions according to market conditions.

Non-Metallic Minerals.

In normal years about 20 per cent of the value of Ontario's mineral output is derived from non-metallic minerals, clay products and materials of construction such as cement, stone, lime, sand and gravel. In 1919 non-metallics made up nearly 30 per cent of the total mineral output. Certain products directly or indirectly used as war minerals such as iron pyrites, fluorspar and graphite will not make as good a showing as in 1919.

Reports supplied by the Supervisor of Petroleum Bounties would indicate a production of crude oil for 1920 of about 170,000 barrels worth nearly $700,000. In the township of West Dover from deep wells in the Trenton formation there was a production of over 10,000 barrels during the first nine months of the year. The total output of crude petroleum from Ontario wells shows a decrease of about 50,000 barrels as compared with 1919, although the valuation was greater. The average price per barrel of 35 Imperial gallons was $2.87½ for 1919. On January 12th, 1920, the price was $3.63 per barrel. On March 10th the price advanced to $4.13 and remained at that figure for the balance of the year. Producers receive in addition a bounty of 52½ cents per barrel from the Dominion Government.

West Dover wells, some of which are 3,700 feet deep, produce both oil and gas. Such deep drilling is very expensive. The output from the Tilbury natural gas field is rapidly declining as indicated by the rock pressures and open-flow measurements. The field, a marvellous producer for 15 years, has arrived at the stage where only a limited supply should be drawn upon, otherwise water flooding will take place and the field be ruined in a few weeks time. The total output of natural gas from Ontario in 1920 is estimated at 11,500,000,000 cubic feet, approximately the same as for 1919. If the question of gas rates is settled in the near future, exploratory drilling will be stimulated and the restricted use of the output will tend to prolong the lives of the fields.

Structural Materials.

The building industry is reviving which means a larger output of structural materials. Had labour and fuel costs been more moderate the output of clay products would have been much greater than in 1919. Towards the close of the year soft coal became more plentiful and cheaper. The same remark applies to labour, which means increased efficiency. The outlook for 1921 in the building industry would indicate a considerable increase in the output of structural materials.

MINING STATISTICS 1920-1919-1918.

(Supplied by Division of Mineral Resources and Statistics Mines Branch, Ottawa.)

	1920.	1919.	1918.
Total Mineral Production of Canada (Value in Dollars)	$200,000,000	176,685,390	211,301,897
Pig Iron Production, (Short tons)	1,080,000	917,781	1,195,551
Steel Ingots and Castings, (Short tons)	1,220,000	1,030,342	1,873,708
Copper production, (Pounds	82,500,000	75,053,581	118,769,434
Zinc Production, (Pounds)	42,000,000	32,194,707	35,083,175
Gold Production, (Value in Dollars)	$16,000,000	15,850,423	14,463,689
Silver Production, (Ounces)	13,500,000	16,020,657	21,383,979
Nickel Production, (Pounds)	61,500,000	44,544,883	92,507,293
Lead Production, (Pounds)	35,500,000	43,827,699	51,398,002
Coal Production, Short tons)	16,000,000	13,681,218	14,997,926

MINERAL PRODUCTION OF NOVA SCOTIA, 1920.

By the courtesy of Mr. Hiram Donkin, Deputy Commissioner of Mines in Nova Scotia, we are enabled to give figures of mineral production and of iron and steel operations in the Province during the Mines Year, which closes 30th September.

GOLD MINING.—The production is nearly 200 ounces below that of 1919, and marks another new low point. The causes of decline are those that have affected gold mining elsewhere.

SALT MINING.—As will be seen from a note on the Malagash Mine, elsewhere in this issue, salt production has become an important item in provincial mining. The production during the mines year was 3,100 tons, which was disposed of to the fishing industry, ice-cream manufacturers, and for use on railways and tramways. The possibility of still greater concentrations of potash being found at depth is generally accepted.

COAL MINING.—This was fully dealt with in our last issue. The figures for the mines year showed an output of 5,682,000 long tons in 1920 compared with 5,005,000 tons in 1919.

STRUCTURAL MATERIALS.—In common with the rest of the Dominion, the year showed an improvement in output of clay products and structural materials, particularly gypsum, a staple of Nova Scotia. Firebrick is reported separately from common brick for the first time.

No production of tungsten or molybdenum took place during 1920. Manganese ore to the extent of 100 tons, and barytes to the extent of 550 tons were produced, and 500 tons of arsenical concentrates.

Comparison with previous years is as under :

Mineral Production of Nova Scotia.

(For years ended 30th September)

	1918	1919	1920
Coal, long ton . . .	5,265,404	5,004,757	5,682,000
Pig Iron, short ton.	415,808	334,500	280,600
Steel Ing., short ton	512,377	374,888	361,700
Coke, short ton . .	584,891	518,713	382,600
Gypsum (crude) ton	56,816	48,868	174,500
Gypsum (calcined).	5,100	7,107	5,100
Brick No. of	13,379,600	12,894,550	18,350,300
Brick Fire	.....	.....	33,600
Drainpipe and tile lineal feet	1,001,792	605,872	1,164,270
Gold, ozs.	1,279	935	740
Ammonium Sulphate (long ton) . . .	4,788	6,698	6,000
Benzol imp. galls..	.....	.....	236,600
Toluol, galls.	705,000	19,638	107,500
Solvent Naptha, gal.	.....	.....	37,160
Tar, galls.	.....	.....	4,610,200
Barytes, long ton . .	1,600	50	550
Scheelite, long ton	120	.....	.....
Manganese Ore, tons . .	.....	.....	100
Imported—			
Iron Ore, tons	.....	648,028	599,009
Manganese Ore, tons	.....	.....	100

Mr. H. Sweaton who has been recently on the staff of the Temiskaming Testing Laboratories at Cobalt, has joined the staff of Thos. Heys & Son, Analytical Chemists, Toronto.

MALAGASH SALT MINE, NOVA SCOTIA

Messrs. Chambers and Mackay are prosecuting the mining of salt and low-grade potash at their mine at Malagash, Nova Scotia, and are investigating further the large possibilities for use of the potash material for a fertilizer salt.

The analysis of the material used as a fertilizer shows insoluble matter 12.2 p.c., sodium chloride 81.3 p.c. and potash 1.1 p.c. The results so far have been extremely satisfactory. Agriculturists are not yet decided what the actual benefit is from the use of chlorides, but the use of mixed chlorides, and even sodium chloride alone, is recommended for certain crops. There are good reasons to believe that the potash content of the Malagash deposits will increase in depth, as so far only that portion of deposit has been mined that has been subjected to surface leaching.

The discovery of salt and fertilizer in Nova Scotia is quite important as next to mining, fishing and farming are the staple industries of the Province. Hitherto salt has been imported to preserve the fish, and the average Nova Scotia farm is in dire need of fertilizer.

From the analogy of the Malagash deposit to other salt deposits associated with potash it is quite probable that the occurrence may assume much greater importance than has yet been attached to it.

TO DRILL SILVER ISLET VEINS THROUGH THE ICE.

A carload of diamond drilling outfit arrived at Port Arthur on the 22nd, and was taken to Silver Islet on the 23rd, by the Great Lakes Transportation Company's steamer "Strathmore." This outfit is under contract to the Silver Islet Syndicate, which proposes to undertake a very large footage of drilling.

Operations will be carried on during the winter, drilling through the ice to reach the veins covered by the waters of Lake Superior. These veins were never touched under the old operations at the mine, and are, prospectively, good ground.

The Silver Islet Syndicate, of which Messrs. Jamieson & Peacock, of Duluth, Minn., are the principals, plan to thoroughly explore the dyke, and later to crosscut the hitherto untouched veins. They have outlined an active mining campaign to begin in the Spring of 1921. Their commendable enterprise in undertaking to resuscitate Silver Islet is being watched with great interest and the best wishes of the mining community for their entire success.

MEDALS AWARDED BY INSTITUTION OF MINING & METALLURGY

We are informed by the Secretary of the Institution that the following Awards have been made by the Council :—

The Gold Medal of the Institution of Mining and Metallurgy, the highest distinction in the power of the Council to bestow, has been awarded to Sir Thomas Kirke Rose "in recognition of his eminent services to the advancement of Metallurgical Science [illegible] reference to the Metallurgy of Gold."

"The Consolidated Gold Fields of South Africa Ltd." Gold Medal and Premium of Forty Guineas has been awarded to Mr. H. Livingstone Solomon for his Paper "A Contribution to the Study of [illegible] (Transactions Vol. XXIX 1919-1920).

Gold and Silver Mining in Northern Ontario

Gold Production Exceeds any Previous Year but when By-products are Added to Silver Production, its Lead was maintained during 1920.—In 1921, Gold Output Promises to Exceed Silver in Value.

Review by J. A. McRAE, Cobalt.

The Gold Mines.

Gold mining in Northern Ontario has come to be regarded as a leading industry. Output for the year 1920 will amount to over $11,000,000, and will easily exceed any previous record in the history of gold mining in this province. The achievement is remarkable in the light of the fact that in nearly every other country the production has been declining.

High grade ore has enabled the leading companies to operate in the face of extremely adverse economic conditions. In spite of the obstacles to overcome, in no case has it been necessary to resort to selective mining and prematurely jeopardize the physical condition of the mines. In each case, the estimates of ore reserves at the end of 1920 promise to at least equal the average gold content as estimated when the year began. Not only is this a tribute to the managerial staffs but it conveys to the stockholders that the future may reasonably contain even a fuller measure of prosperity than that already experienced.

Basing calculations on the ability of the gold mines to establish a new record under the drawbacks of one of the tensest periods of economic pressure ever experienced in this country, what may be the achievements of the industry during times when reasonably normal conditions prevail? During the first, second and third quarters of 1920 the gold mines of Porcupine and Kirkland Lake were able to procure not more than two-thirds of the required number of workmen, and production was proportionately reduced. During the last quarter of the year, the supply of labor commenced to increase, a condition which the mines were not able to take full advantage of owing to extremely low water in the rivers having caused a pronounced shortage of hydro-electric power. This, of course, is a purely temporary reverse, and may be eliminated when reviewing the future outlook.

The crash of commodity prices is as music to the ears of the miners of gold. For every cent decline in the cost of material an extra cent is added to the margin of net profit realized. For every dollar saved on the material used in the industry, another dollar is made available for dividends. The reason for this is that no matter how low the cost of material may decline, the product of the gold mines will continue to command a full $20.67 an ounce. Gold is the yardstick of commerce, its value never fluctuates. Hence, with adverse economic conditions the industry suffered greatly during the recent period of inflated costs. Therefore, when output actually increased in the face of such adversities, the achievements of the future in the light of a rapid downward swing in costs, may reasonably exceed all former calculations.

Big Asset Paid For.

A factor which bears heavily in relation to a comparison of past and present production in gold from the Mines of Northern Ontario has to do with the fact that in the early stages of the recent war the leading mining companies were caught in the midst of extensive constructive programs. For the greater part, this construction work was completed and its cost was paid for out of current operations. However, labor shortage prevented the companies from utilizing these added mining and milling facilities and left the work as an enormous asset for the future. This asset as yet lies dormant, but during 1921, as all signs point toward a most favorable era for gold mining, it promises to be brought into full play.

The Progress Made.

Gold was first discovered in the Porcupine field in the year 1909. Other discoveries soon followed in Kirkland Lake, Boston Creek, Munro Township, Sesekinika, Beaverhouse Lake, etc., and since that time the following summary presents an idea of the success achieved, it being kept in mind that adverse conditions fell heaviest in 1918, 1919 and 1920, but with 1912 offering promise of greatly improved conditions:—

Year.	Ounces.	Value.
1910	3,089	$ 63,849
1911	2,062	42,625
1912	86,523	1,788,596
1913	219,801	4,543,690
1914	268,264	5,545,509
1915	406,577	8,404,693
1916	497,836	10,339,259
1917	420,894	8,698,881
1918	411,878	8,500,480
1919	505,963	10,451,688
1920 (est.)	560,000	11,381,008
Total	.....	$59,760,270

To understand the position of the gold mining industry from the point of view of the great likelihood of early increases in production, it is only necessary to keep in mind a few facts. First, that the ore blocked out and ready to mine amounts to around $70,000,000, or the greatest amount so far in the district's history. Second, that the supply of labor promises to fully meet the demand within the early part of 1921. Third, is the large amount of milling equipment ready to be pressed into service, which may be estimated by an analysis of the following summary:—

Facilities for Milling Gold Ore.

The Porcupine Gold Mines—

Mine	Daily Capacity in Tons	Present Rate in Tons
Hollinger Consolidated	3,500	2,000
Dome Mine	1,400	1,000
McIntyre-Porcupine	600	550
Schumacher Mine	200	Closed
Northerown Mines	140	80
Porcupine V. N. T.	120	Closed

Dome Lake	100	Closed.
Davidson Consolidated	36	Closed.
Newray Mine	25	Closed.
Totals	6,120	3,630
The Kirkland Lake Field—		
Wright-Hargraves	180	Just completed.
Kirkland Lake Mine	150	100
Tough-Oakes	140	Closed.
Teck-Hughes	120	100
Lake Shore	60	60
Totals	650	260
Munro Township Area—		
Croesus Mine	50	Closed.
Hill Gold Mines	40	Closed.
Totals	90	Nil.
Larder Lake Area—		
Argonant	30	20
Associated Goldfields	30	Closed.
Totals	60	20
Summary—		
Porcupine	6,120	3,630
Kirkland Lake	650	260
Munro Township	90	Nil.
Larder Lake	60	20
Grand totals	6,920	3,910

Note:—Bush fire destroyed two mills at Boston Creek, one at the Miller Independence, and one at the Patrick property.

The Promise Offered.

The average gold content in the ore of the Porcupine district is about $9 per ton. In the Kirkland Lake field the average is higher. These two districts make up the greater part of the producing area. Taking $9 ore as an average, and operating the mills already installed at the rate of 95 per cent possible capacity, the possible output would amount to $22,987,700 annually, or about double that of the present time.

Another point which may be full of important significance is the fact that the production as recorded in this summary has been mined almost entirely from the townships, namely, Tisdale in the Porcupine field and Teck Township in the Kirkland Lake area. With such a record in the highly developed sections of the gold-bearing area, and with gold known to be present in more than fifty townships, as yet only prospected to a limited extent, it is reasonable to expect other important gold producing mines will be developed as exploration work proceeds.

The message, therefore to the outside world is that here in Northern Ontario lies one of the most promising new gold mining areas in the world. The vast stretch of territory constitutes an enormous treasure house of fortune. Each year some one out of every few pioneers seems certain to strike it rich and the field is wide open to all those who care to make a bid for a share of the wealth.

The Silver Mines.

Silver mine operators in Northern Ontario have had a successful year in 1920, although sensational fluctuations have occurred in quotations for the metal. In January of this year, it rose to the record high point of $1.37 an ounce, and at the middle of December had declined to around 60 cents an ounce. For the year, the price has averaged a fraction under $1 an ounce.

For the calendar year 1920, the silver mines of this district produced approximately 9,931,143 fine ounces of silver, according to preliminary estimates, and which had a value of approximately $9,905,088. The decline of about $3,000,000 is due in part to the price of silver having been about 12 cents an ounces lower than during 1919, and also due to labor shortage during the first nine months, followed by a shortage of electric power in the last quarter.

Offsetting the decline in silver output to some extent was the increase in production of Cobalt metallics and Cobalt oxide. These two by-products added about $1,800,000 to the output of the silver mines as compared with some $900,000 during the preceding year, the increase amounting to about $900,000.

Including the by-product with the silver produced, the silver mines of Northern Ontario produced a value of approximately $11,705,088.

Following is a summary of the output from the precious metal mines in the district of Temiskaming during 1920:

The Silver Mines.

Silver	$9,905,088
By-products	1,800,000
	$11,705,088

The Gold Mines.

Gold produced	$11,381,008
By-products	80,000
	$11466 008
Grand total from silver and gold mines	$23,166,088

Silver Mines Still Lead.

It may be seen the gold output now exceeds the production of silver, but that the by-product recovered during the course of mining silver is such as to retain for the silver mines a leading position during the year. As to this, the year 1921 promises to see the gold mines assume the leading place.

About 25 mines contributed to the silver production for 1920. The Nipissing was the heaviest producer, with the Mining Corporation occupying second place.

Dividends paid by the silver mining companies amounted to $3,458,112 during 1920, as compared with $4,232,311 in 1919. The decline was due to adverse economic conditions which caused lower production.

As the year drew to a close, commodity prices showed a tendency to decline. This included the cost of blasting powder. Wages, however, continued high in spite of the reported large surplus of labor.

New Developments.

A noteworthy development during the year was the extensive development of the Keeley Silver Mines in South Lorrain. During the year a large [illegible] containing several hundred thousand ounces of silver ore developed. The property was also equipped with a 20-stamp mill. About the time this mill was completed a power shortage developed, and at the end of the year the plant had not yet been utilized to the extent planned.

At surface on the Keeley [illegible] high-grade veins were discovered and [illegible]

underground will take place in the coming year. The Chambers-Ferland also encountered a new zone of mineralization on that part of its property lying between the Nipissing and La Rose properties. The further development of this will be included in the interesting work of the coming months.

On the Crown Reserve mine one of the most interesting pieces of exploration work is being done, diamond drilling to a depth of about 2,000 feet. This work is for the purpose of determining whether or not another diabase still lies somewhere beneath the one close to which the Cobalt silver deposits occur.

As regards the future for the silver mines of this field, the price of silver and the question of obtaining cheaper supplies as well as wages at the mines, may be expected to determine to a large extent the scope of operations.

Following is a summary of production from the silver mines since 1903:

Northern Ontario Silver Output from 1903 to 1921.

Year	Average Price, cents per ounce.	Fine ounces	Value $
1904	57.2	206,875	111,887
1905	60.4	2,451,356	1,360,503
1906	66.8	5,401,766	3,667,551
1907	67.5	10,023,311	6,155,391
1908	52.9	19,437,875	9,133,378
1909	51.5	25,897,825	12,461,576
1910	53.5	30,645,181	15,478,049
1911	53.3	31,507,791	15,953,847
1912	60.8	30,243,859	17,408,935
1913	57.0	29,681,975	16,553,981
1914	54.8	25,162,841	12,765,461
1915	49.69	24,746,534	12,135,816
1916	65.66	19,915,090	12,643,175
1917	81.41	19,401,893	16,121,013
1918	96.77	17,738,153	17,415,882
1919	111.12	11,383,905	12,913,316
1920 est.	99.89	9,931,143	9,905,088
Totals		313,777,373	191,704,275

Gowganda and Elk Lake.

In a general way, mining operations continued active in the Gowganda district. The Miller Lake-O'Brien continued to produce at the rate of about three quarters of a million ounces annually. Also, on the Castle property of the Trethewey Company, considerable high grade ore was encountered, and the operation about paid its own way. The proposed light narrow-gauge railway was not built as planned during the Summer, and the question of transportation is still a serious handicap.

In the Elk Lake district, a limited amount of exploration and development work was done on such properties as the Triangle, Cane Silver, Regent and White Reserve.

Summarisation of Gold and Silver Production, Capitalization and Dividends Disbursed.

The production of silver and gold from the district of Temiskaming since the discovery of silver in Cobalt in 1903, and the finding of gold in the Porcupine field in 1909 has reached a grand total of over a quarter of a billion dollars.

Production Total.

It may be summarized as follows:

Silver	$191,704,275
Gold	59,760,270
Grand total	$251,464,545

Added to this are several million dollars in by-products, making a total of perhaps close to $260,000,000.

1920 Dividends.

Dividends paid during 1920 were made up and compare as follows with 1919:

	1920	1919
Silver	$3,458,142	$4,232,341
Gold	3,240,042	2,368,039
Total	$6,698,184	$6,600,380

Dividends paid by the silver and gold mines of Northern Ontario since 1904 up to the end of 1920 are as follows:

Silver	$81,975,040
Gold	18,785,280
Grand Total	$100,760,320

In addition to this large amount of net profit distributed among the shareholders of the mining companies, about $4,000,000 may reasonable be estimated to have been earned by close corporations, thereby bringing the total up to approximately $104,750,000.

In addition, the various companies carry an additional amount in treasury surpluses which may aggregate $15,000,000. From this it may be seen that the net profit realized may reach not far under fifty per cent. of the total value produced, and thus constitute a record perhaps unequaled in any other mining field in the world.

Following is a detailed summary of the capitalization and the dividend record of the paying mines:

Cobalt Field.

Company	Stock Iss.	1920 Div.	Total Div.
Aladdin-Cobalt	$ 500,000		75,000
Beaver Cons.	2,000,000	60,000	710,000
Buffalo Mines	150,000		2,787,000
Casey-Cobalt	100,000		203,249
Cobalt Central	5,000,000		192,845
Cobalt Comet	1,000,000		230,000
Cobalt Silver Queen	1,500,000		315,000
Coniagas	4,000,000	500,000	10,140,000
Crown Reserve	2,000,000		6,190,849
Foster-Cobalt	1,000,000		45,000
Hudson Bay	3,200,050		778,909
Kerr Lake	2,400,000	75,000	8,860,000
La Rose	1,500,000		6,300,546
McKinley-Darragh	2,500,000	269,723	5,955,391
Mining Corporation	8,300,250	653,419	5,530,768
*City of Cobalt	1,500,000		145,000
*Cobalt Lake	3,000,000		465,000
*Cobalt Townsite	45,011		1,042,259
Nipissing	6,000,000	1,800,000	23,083,297
Penn Canadian	1,349,705		256,443
Peterson Lake	3,000,000		462,350
Right of Way Mining Co.	500,000		324,643
Right of Way Mines	2,000,000		252,825
Seneca-Superior	478,884		1,579,817
Temiskaming	2,500,000	100,000	2,159,156
T. & H. B.	7,761		1,940,250
Trethewey-Cobalt	1,000,000		1,211,998
Wettlaufer	1,416,590		637,465
Totals		$3,458,142	$81,975,040

The Porcupine Field.

Dome Mines	$ 476,000	$ 400,000	$ 1,900,000
Hollinger Cons.	24,600,000	2,214,000	13,360,000
McIntyre-Porcupine	3,640,283	546,042	1,994,655
Porcupine Crown	2,000,000	.....	840,000
Rea Consolidated	200,000	.....	12,000
Totals		$3,160,042	$18,106,655

The Kirkland Lake Field.

Lake Shore	2,000,000	80,000	280,000
Tough-Oakes	2,657,500	.....	398,625
Totals		$80,000	$678,625

Grand Summary of Dividends.

Cobalt	$81,975,041
Porcupine	18,106,655
Kirkland Lake	678,625
	$100,760,321

Metal Mining in British Columbia During 1920

Decline in the Metal Market.—Particularly in Copper Prices.—Hindered Production.—Silver and Gold Production both Show Reduction. —While Outlook is Uncertain it is one Phase of General World Condition, and Does Not Affect Soundness of Mining in British Columbia.

Review by Robert Dunn, Victoria, B.C.

Copper.

There can be no doubt that the weakness of the copper market is having its effect on the industry in British Columbia. How serious this is to be depends entirely on the length of time it takes for world conditions to adjust themselves. At present it must be admitted, and it serves no good purpose to attempt to blind ourselves to the facts, the outlook does not look particularly promising. With the Granby Company's forces at Anyox materially reduced; with the Britannia Mining & Smelting Co., according to authentic report, devoting itself to development of its properties to the exclusion of production and shipment, which policy has meant a cutting down of the working force; with the Canadian Consolidated Mining & Smelting Co. at Trail making declaration that for the time only necessary construction will be proceeded with; and with the Canada Copper Co., newly established at Allenby and with its Copper Mountain Mines just in shape for production, announcing that operations must cease until the market improves, it is quite clear that the larger mining corporations of this Province have concluded that it is impossible with copper at its present low figure to produce the metal at a profit.

That many of those close in touch with the situation declare that it cannot last for long, and that as soon as copper climbs back to its normal place the Granby, Canadian Consolidated, Canada Copper, and other British Columbia Companies will resume with renewed vigor both production and development, constitute the silver lining to the cloud. And in passing it is interesting to direct attention to the paramount importance of copper in consideration of the mining of this Province. When that metal slumps its effect is serious wherever there is a mining industry but in this Province the result is more or less of the character of a "knock out" as, being without an iron and steel plant of consequence and there being no production in iron, it hits at the very backbone of our industry.

Taking the year 1920 all through, up to the middle of December, British Columbia has not done at all badly in point of the production of its metalliferous mining. To give the exact figures is impossible at the time of writing but, from the general information available, it would appear that the output of Copper for the twelve months will be about equal to that of 1919, viz., 42,459,339 lbs. For the first nine months of the year, it must be borne in mind, the larger companies, for the most part, maintained their production at a high level. The Britannia Mining Company, for instance, milled as many tons of ore as it did in 1919 before the copper market fell into the doldrums. The price having fallen to 14 cents a lb. in New York production was cut down, otherwise the tonnage treated by flotation in the concentrating mill at Britannia this year might have established a new record for the plant.

These latter observations tell the story of the operations of the Granby Consolidated Mining & Smelting Co. at Anyox. Not until the latter part of the year was the output reduced so that it is expected that the figures for the twelvemonth will not be unfavourable in comparison with those of the previous year.

As to the Consolidated Mining & Smelting Co., at Trail, it is not at present a large producer of copper. Its returns in this respect are likely to be unfavourably affected because of the fact that Rossland Mines have not been shipping largely. With a large variety of independent shippers, although none contributing in quantity and regularly, and with some shipments of importance from the Mandy Mine of Manitoba, the Trail Smelter returns, however, may contain a surprise.

This Company, in a greater degree than heretofore, is turning its attention to copper. The construction of concentrating plants at the "Old Sport" Group of Claims, Quatsino Sound, Vancouver Island; and at the "Smelock" Jordan River, V.I., had been planned for 1920 but costs of labour, supplies and machinery were so high as compared with the average price of the metal and the projects were permitted to stand. A start on these plants may be looked for during the new year. The intervening time has not been lost, development having continued, working openings having been driven on both properties and diamond drilling so pursued that much greater tonnages of ore have been proved.

The Tidewater Copper Company, operating the "Indian Chief Group" of Crown Granted Mineral Claims, Sidney Inlet, west coast of Vancouver Island, is an enterprise to which special attention should be directed. Through the adoption of a well thought out policy and faithful adherence to the same this Company has placed itself in a position to mine and ship considerable

tities of concentrates over a long period with every prospect of developing further resources as the work continues. During the past two years a sufficient body of ore has been blocked out to furnish 300 tons for treatment daily for two years by a mill which has been reconstructed, enlarged and much improved. In connection with the latter a battery of "Peterson" flotation cells and an electrical plant for driving all machinery, including the air compressor, have been installed. Two creeks have been used for the generation of power, the necessary plant having been provided.

The Kamloops District will show a drop in copper production this year because of the closing down of the "Iron Mask" Mine. This took place last April and since that time a start has been made in the installation of a new water system and in other improvements to the Mine and Plant. The shaft has been straightened, new concrete foundations to the head gear provided, a new conveyor built from the shaft to the mill, and increased storage constructed for the treatment liquids.

Gold.

With reference to the 1920 production of Gold it may be said with reasonable certainty that there will be a decline in comparison with the previous year. In placer mining there has been considerable activity manifested in the Cariboo, and further North and Northeast. Whether this will have any effect on the sum total of production, however, is doubtful because there is no doubt that, for the most part, this season's work has been along the lines of development, so that results are not likely to become apparent at least for another year. In 1919 the placers of British Columbia produced 14,325 ounces of gold. That the lode-gold mining will not show as satisfactory results as in 1919 is assumed from the fact that the Rossland Mines, Consolidated Mining, Smelting & Power Co., have been very quiet and that the Nickel Plate Mine, Hedley Gold Mining Co., had been slowing down for some time prior to the final close of the mine for an indefinite period. This occurred some two or three months ago and was the result of high costs and the diminished purchasing power of the yellow metal. The management figured that, until more normal conditions returned, it would be good business to leave the riches of their property in place. It is not advisable, however, to make anything but a qualified prediction in respect of gold, because while it is true that the Rossland Mines have not been producing, it must be remembered that they did not do much in 1919; and, although it is a fact that the Nickel Plate cannot be depended upon for a large production, it should be borne in mind that there will be a considerably greater return in gold from the output of the Premier Mine, Salmon River. The lode-gold production for 1919 was 152,426 ounces.

Silver.

Notwithstanding that the Silver production of the northeast of British Columbia, wherein is situated the Dolly Varden Mine, will be substantially greater than in 1919 it looks as though the general 1920 output of the white metal in this Province will be less than it was in the previous year. The whole of the provincial coast and the Boundary District will show about the same production for this year, or perhaps a little better than in 1919. If the figures are higher the credit will have to go to the Premier and the Dolly Varden Mines, especially the latter, which has been operated on a large scale throughout the year and from which a large quantity of high-grade silver-bearing ore has been shipped. But the Slocan District will be found to be short in production and, in order that the significance of this may be properly understood, let it be said that in 1919 the Northern Coast produced in silver, 920,413 ounces; the Boundary-Yale District, 231,599 ounces; East Kootenay, 274,134 ounces; and West Kootenay, 1,799,229 ounces. The total for the Province was 3,403,119 ounces. It is only necessary to add that the richest silver mines of West Kootenay are in the Slocan.

What have been the conditions in the Slocan responsible for the slump? Two circumstances have served to well-nigh throttle the industry. One was the lack of labor in the early part of the year and the other the discontent which developed later among the miners, finally resulting in a strike called by the One Big Union. If the workers aimed to tie up the mining industry they were successful beyond a doubt. The operators refused their demands with one exception, viz., the management of the Silversmith Mines, Ltd. operating the old Slocan Star, and for months only that property was active. The situation now has changed. The lumber business has fallen off, logging is at a standstill, and there are plenty of men for the mines. Latest advices are that work has been resumed on most of the well-known properties of the District but the damage, as far as the year's production is concerned, has been done and the effect may be expected to be shown in the official statistics.

Lead and Zinc.

The production of lead and zinc depends largely on the output of the Sullivan Mine, of Kimberley, B.C., which is treated at the Trail Smelter of the Consolidated Mining & Smelting Co. This mine has been extensively developed and it has been yielding greater quantities of ore so that it is possible the lead production of the Province, which in 1919 was 29,475,968 lbs. will be about the same for 1920. There is no doubt that there will be a falling off in the product of the Slocan so that much depends on the showing made by the Company's Mines. In regard to zinc the same remarks apply, except that it would appear likely that 1920 will show an increased output of that metal. Again the Sullivan Mine is responsible, it being known that zinc ores were largely mined at Kimberley during the past twelvemonth. In 1919 East Kootenay produced 46,460,705 lbs. of the total 56,737,651 lbs.

Basic Conditions not Injured by Trade Depression.

Taking it as a whole the foregoing is not as bright a review as it has been possible to give for several years but it is not unsatisfactory. British Columbia mining men cannot avoid being affected by the world's metal markets. For some time exceptionally high prices in copper, silver, and other products of the minerals of this Province were enjoyed and the fullest advantage was taken of the opportunities thus afforded for development. Consequently the industry has advanced far beyond the point it had reached five years ago in respect of productive possibilities. The present slump in the market, the existing unsettled conditions, and the results apparent in this Province, should not be viewed with alarm. They would be met with fortitude and optimism, confident in the knowledge that, when conditions are such that it will be economically practical to mine copper in this Province, the industry will be resumed on a scale never before attempted; confident also in the assurance that the richness of British Columbia's resources guarantees to the producers of gold, silver and other metals as full a measure of success as can be looked for anywhere else on the continent

A RETROSPECT OF THE YEAR IN MANITOBA.

R. C. WALLACE.*

In looking back over the year that is gone, one feels it advisable to direct attention rather to major considerations in the mining situation than to details of mining progress. This is all the more in order as fairly complete details of the work of the past summer have already appeared in an article published by the "Journal" in the issue of October 22nd, 1920. To this the curious reader may be referred.

Since 1910 it has been uphill work in Manitoba. A province which is so pre-eminently agricultural turns out readily to follow new lights. There was sometimes more than a suspicion that the new light was a will-o'-the-wisp. There was a well-defined attitude that we had done well enough by the soil and could do still better, and should confine our strivings to that channel—all of which was very natural, if the horizon was limited. The great extent of territory ceded to Manitoba in 1912 extended the horizon and seized the imagination of many citizens with visions of the day when agriculture in the south and industry based on mineral, forest, and water power wealth in the north, would blend to maintain a population to whom scope would be given for the utilization of diverse aptitudes and abilities. Fortunately, discoveries substantiated the visions, and business-like development work seconded the discoveries. As a result, the year that has passed opened with Manitoba not yet numbered among the important mining provinces, but to be counted to pass some day into that category.

The year closes without any important production to record. True, the final shipments from the Mandy Mine went through to the Trail Smelter, completing a production that totals more than $2,000,000 in copper, gold and silver. There was a small production of gold from the Rex Mine, but blocking out of ore rather than milling was the aim. Trial mill-runs from the Northern Manitoba and Bingo properties completed the actual production for the Province in metallics. The progress for the year lies in other directions not so amenable to statistical treatment, but none the less significant.

The visit of members of the Provincial Legislature to the Flin Flon property has already shown important results. For the first time many members of the House, whose concerns were mainly with agriture, met north-country prospectors and mining men, appreciated north country conditions and received a north-country welcome. They cherish warm recollections of the North and will deal with proposals to aid development with that background of knowledge and sympathy which is necessary in the task of developing the North. They were deeply impressed with the property they were invited to see, and with the opportunities in a country in which such a property has been found, and they have lost no opportunities to impress their constituents with their own convictions.

The Winnipeg meeting of the C.I.M.M. achieved in a notable way the purpose for which it was planned. It is the part of the Institute to point the way to the new fields and to expose the pit falls that may lie in the path, just as truly as it is its duty to smooth the difficulties that confront the industry in fields already developed. We in Manitoba have had reason to appreciate very fully the extent of the assistance which the Winnipeg meeting has given to the Province in many and unexpected ways, and fellow-members in Alberta have expressed themselves as more than pleased at the interest taken by the citizens of Winnipeg in the discussion on the utilization of western coal. It was specially important that this central city of Canada should appreciate the fact and the importance of the fuel resources of the west. The practice of this winter would seem to indicate that the citizens of Winnipeg have decided to encourage the industry in a very practical way. Western annual meetings have come to stay. They will ensure the active co-operation of the western members in the affairs of the Institute as a whole, a result which was much to be desired.

The main features of the year are the renewed interest in the Rice Lake area, the discovery and investigation of nickel-copper-bearing norites of the Sudbury type south of the Rice Lake field, and the developments on the Flin Flon property. The year closes with the assurance that this property will be bought in March, 1921. The next few months will be very critical for Manitoba, but we look forward to the outcome with a confidence based on the facts of our discovered mineral wealth.

*Commissioner of Northern Manitoba

CRAIN'S DIRECTORY AND MARKET DATA BOOK.

Crain's Market Data Book and Directory of Class, Trade and Technical Papers, now on the press, promises to be of unusual interest to advertisers generally and users of trade and technical papers in particular. It not only lists all of the business publications of the United States and Canada, giving circulations, rates, type page sizes, closing dates, etc., but supplies a market analysis of each trade, profession and industry. Thus the reader is given the basic facts of each line in which he may be interested, including its buying power, buying methods, character of requirements, etc. The volume, which is bound in cloth and contains nearly 500 pages, is published by G. D. Crain, Jr., 417 S. Dearborn street, Chicago. The price is $5. Orders in advance of publication are being accepted at the rate of $3.75.

Results of recent examinations held by the British Columbia Department of Mines for certificates of competency as coal mine officials have been announced as follows:

Third Class: George A. Brown, Michel; Thomas Smith, Merritt; Ralph H. Chambers, Nanaimo; James Sim, Merritt; John Walls, Coal Creek; Fred Menzies, Nanaimo; Steve Klegko, Coleman, Alta.; Ernest Waites, Nanaimo; John Hynd, Nanaimo; Preston Boyle, Cumberland.

Second class: William Hynds, Fernie; Hugh Osborne, Corbin.

Mine Surveyors: James T. Hepburn, Nanaimo; Edward Hughes, Michel; E. S. Bowerman, Nanaimo; Austin Wright, Nanaimo.

The examinations were held at Fernie, Michel, Nanaimo and Cumberland. There were [illegible] for first class certificates, four for second class, fifteen for third class and six for mine surveyors.

A Montreal Letter

By ALEX. GRAY.

Oil Fields Regulations.

Ottawa authorities have been exacting about the new Northwestern Oil Fields. They understand what are the physical and fiscal pre-requisites for those who wish to participate in the adventure. Mounted Police are seeing to it that the vanguard possesses physique, and will be able to undergo privations. But in stipulating that individual holdings shall be restricted to 640 acres and that the Government shall become a fifty-fifty partner in respective areas, besides having the option to take a variable percentage, unlooked for discouragement was recorded. Said one person interested: "There is no use in the 'tender-foot' going into that country with 'two bits.' Having located 640 acres, the Government takes half and the half the Government gets must be as valuable as the half the locator retains. Now, how can that be determined? It will take money to prove it, and those who provide the money must have the wisdom of Solomon and assume all the risk. Then, there are several optional features in the regulations. The Government may take so much, and so much more. The effect will be, that large concerns alone can stand the strain. I have sent a party into the Mackenzie country. We have to have seven or eight relays of dog teams and drivers, for each team of dogs must have its own driver, whom the dogs must know, or they won't work for him. Beforehand we had to provide food for the dogs at each station. One small party cost me $7,000. It is all right enough to impose restrictions, and to have it understood that stamina is required, but it has been made more difficult to obtain capital, and very few, even of the important oil corporations, have money to play with, just now."

Washington Waives Assessment Work.

President Wilson has acquiesced in petitions for the waiving of assessment work upon mining claims. A six months extensions has been granted by him. While this concern is warranted in that it relieves all holders of ground from the necessity of what in ordinary times may be considered a relatively trifling outlay, it will also have a slight effect in the conservation of labor. Mining fields in general are feeling the pinch—only gold producers being encouraged—and the aim is avoid needless operations. This, of course, militates against "prospects" and non-producers, and yet working capital for new ventures is so scarce it might as well be recognized that priority should be given to those in a position to continue outputting. Undoubtedly a more plentiful supply of labor will permit considerable activity next summer, but the unproved things can await easier money conditions. So Washington was wise in deferring assessment work.

The Forward View.

Colonel Leonard and his co-directors of Coniagas Mines, bestowed the customary seasonal greetings upon shareholders. Assets of $6,734,972 after distributing $10,140,000, carry no regrets. The mines, mill and metallurgical works continue to be sources of pride

Sauerman drag-line excavator at Coniagas Mine reclaiming sands carrying 3 to 3½ ozs. of silver per ton. The sand is re-ground in tube mills to 100-mesh and treated by the flotation process.

(Photo loaned by Ont. Dept. Mines.)

to those who have followed the fortune of the company throughout its money-making years. Messrs. Leonard, Longwell, and others who pioneered the enterprise and have never permitted it to become a mining share-market feature, deserve the millions they have derived. Constructive and clean-handed, their 40-acre "patch" has enabled them to reinvest a not inconsiderable part of their capital in reproductive undertakings designed to benefit the country and mining industrialism in particular. In all respects, Coniagas has been distinctly Canadian, and this is written without prejudice to those American capitalists and capable mining chiefs whose technical control greatly strengthened the status of Ontario's silver industry. The directors see in "the changed conditions as affecting the supply of labor and cost of materials, which present tendencies indicate," a surer foothold on "greater economies in production," and that is inspiriting.

"Railways Through Gold Fields."

Under that heading The Globe editorially implies that it favors the construction of about eighty miles of railway from Westree on the Canadian National to Swastika on the Temiskaming and Northern Ontario Railway. The Globe does not explicitly advocate it, but it cites the results obtained from other railways built in Northern Ontario and gives space to this scenario on what the projected line may bring in the way of "an enormous output" of "precious metals":

"It is claimed that in addition to gold, silver and iron there are in these rich regions many other valuable minerals, including barite, fluorite, asbestos, potash-feldspar, molybdenite, sheelite and platinum. The presence of periodite in dykes and larger masses makes it probable that platinum, chrome iron and possibly diamonds will be found in economic quantities."

The list of "probabilities" and "possibilities" need not have ended there. Anything is "probable" and "possible" in Ontario's Wonderland. It has not been shown, perhaps, conclusively shown, there are so "many potentially large mines of gold and silver in West Shining Tree, Gowganda, Matachewan, and other fields," and yet "you never can tell": The "triangle lying northwest from the junction of the Temiskaming and Northern Ontario Railway and Canadian National Railway at North Bay" has been the happy and unhappy hunting ground of prospectors, was pretty thoroughly "papered," has a good deal of what is claimed in its behalf, but not all peridotite contains diamonds or platinum, and not every gold and silver prospect will contribute to the support of a railway. It will be noted that the printer erroneously injected "periodite" instead of peridotite, but really the periodic petitions for railways before there is profitable tonnage, indicated or proved, are somewhat premature. Larder Lake proferred "potentially large" propositions as needing rail transportation, but nothing so semtillant as the attractions of the "triangle" arrayed in the tentative prospectus. Rare metals, royal gems, a series of Geological Ages, and "potentially large" mines will, when substantiated, justify such a railway. As yet the tonnage offering has been mostly script.

Metals A'Begging.

Copper at 12½ cents for January and February delivery; zinc at 5.70-5.75 cents—and a dearth of cash buyers at that—did not provide "good cheer" at the year-end. There cannot be a great deal of the former on hand. With rare exceptions it cannot be produced for the price; consequently Canada is out of it for the moment. The American "porphyries" cannot meet the market and make any money. One or two of the older companies—notably Calumet & Hecla—are availing of Flotation with their stored tailings, and are putting something on the right side of their ledgers. Otherwise, the copper situation is dolefnl, the one consolation being that "it is darkest before the dawn." For zinc there is slightly more inquiry, but the margin is too close for comfort, notwithstanding Canada is able to produce it as cheap as the cheapest. Besides, there is a lot of spelter awaiting buyers.

British Columbia Letter

The Metal Mines.

The necessity of encouraging the production of gold in British Columbia is becoming increasingly apparent and the latest public body to take action is the Mining Bureau of the Vancouver Board of Trade which recently passed a resolution offering a number of suggestions to the Dominion and Provincial Governments. One is the removal of all taxation on gold mines until "such time as conditions return to normal;" another "the return to Canada of all gold produced from exported ores and the purchase thereof by the Mint at Ottawa and the Dominion Assay Office at Vancouver;" and a third "that all gold sold by the before-mentioned institutions for industrial purposes should be so priced as to cover the normal cost of production, any surplus revenue to be distributed among the gold mining companies in proportion to production."

The interests of the Bullion Gold Mining Company in the Cariboo District, B.C., are reported to have been optioned to a syndicate of New York and Kansas City financiers. R. T. Ward, manager for the Company, states that $20,000 already has been paid down on the deal. Mr. Ward and his associates acquired the Bullion property in 1913. It first was owned by Sir William Van Horne, Lord Shaughnessy and other C. P. R. officials. Later it was taken over by the Guggenheims, who sold to the present owners. About $1,000,000 have been spent in development. Previous to the litigation between Ward and Hopp, which resulted in the former's success, the digging of a canal to carry the waters of Spanish Lake to the scene of mining operations was started. To complete this will cost $250,000, Mr. Ward asserts, nothing having been done for the past six years. The canal will be fourteen miles in length. At the present time the waters of Morehead Lake are carried twelve miles and Bowron Lake also a considerable distance. Thus there is an assured supply of water for two years work on. Mr. Ward explains that he is looking to the future so that the property does not pass out of his hands. The Company is prepared to carry on development and operations itself.

Receipts of ore received at the Trail Smelter of the Consolidated Mining & Smelting Co. Ltd. totalled

9,967 tons for the week ending December 21, making the aggregate for the year 369,871 tons. The following shipments appear in the weekly statement:

	Tons
Canada Copper, Allenby	161
Horn Silver, Chopaka	53
Josie, Rossland	257
North Star, Kimberley	190
Paradise, Lake Windermere	138
Company Mines	9,168

Unconfirmed reports are in circulation in mining circles to the effect that negotiations are in hand having in view the transfer of the holdings of the Granby Consolidated Mining & Smelting Co. Ltd, at Anyox, including the Hidden Creek Mine, and at Cassidys, Vancouver Island, where is situated a modern coal mining plant now in active operation, to the Canadian Consolidated Mining & Smelting Co. These stories must be taken with much reserve because it seems to those best informed highly improbable that the Granby Company is desirous of abandoning its mining operations in British Columbia. However as they have been given publicity there can be no harm in making passing reference to them. It is stated, briefly, that engineers representing the Canadian Consolidated, a subsidiary corporation to the C. P. R., have been over the plant of the Granby Co. at Anyox; that the C. P. R. would find it convenient to have the output of the Cassidy Collieries available now that coal is replacing oil as fuel for its coast steamships and its British Columbia railways; and that the Canadian Consolidated has long been feeling its way towards the establishment of a smelter on the coast. On the latter point reference is made to the Company's expenditure of approximately half a million dollars in the development of the Old Sport Mineral Claims, Quatsino Sound, Vancouver Island; to its interest in the Sunloch Mining Co's properties, Jordan River, V.I.; and to the option it has secured on the Big Interior Group, Great Central Lake, V.I. All these are copper prospects and, if development proves them capable of producing the tonnage of copper bearing ore now indicated, especially in respect of the Old Sport and the Sunloch, a smelter on the coast for the treatment of the ore will be necessary. Hence it is claimed to be not unlikely that the Canadian Consolidated Company would consider the acquirement of the Granby Company's holdings if the latter were open to business.

The Yukon Gold Company is reported to have opened up a rich vein of galena on the Rice Claim, Keno Hill, Mayo District, one sample of ore being said to have given a return of 14,000 ounces of silver to the ton, the average being over 200 ounces to the ton. The Company has installed a power plant and now is using electrically driven compressors and drills. Because of the growing travel to the district, and the now clearly established mining future of the section, the Gold Commissioner has recommended that the Ottawa Government appropriate $100,000 for the construction of an automobile road into the scene of operations.

The Coal Mines.

It is difficult to conceive of a more important announcement in point of its effect on the coal mining industry of Vancouver Island, B.C., than that made a few days ago by J. M. Savage, general manager of the Canadian Collieries (D) Ltd., that a contract has been entered into by his Company to supply the Canadian Pacific Railway Co. with 25,000 tons of coal per month for use on the Company's Trans-Pacific and coast steamships.

The coal is required almost immediately as many of the vessels already have been converted from oil burners to coal burners and the bunkering will be carried out either at Ladysmith or Union Bay, at both of which places are facilities for the shipment of the fuel.

This is the first noteworthy illustration to develop in this Province of the result of the growing scarcity of fuel oil. Coal-mine operators accept it as an indication that the industry is coming into its own again, that the prophecies so often made in recent years are about to be realized, and that the thousands of acres of coal reserves of Vancouver Island shortly will be opened up and made productive in order that the demand, now sure to become evident, may be satisfied.

If the predictions of those in touch with the situation may be relied upon a condition has arisen that assures a market for much more Island coal than is involved in the contract referred to. The statement is made that at least 70,000 tons per month will be wanted in addition to what the collieries have been supplying in the past few years. In support of this it is pointed out that the Canadian National Steamship and the Canadian National Railways both will require fuel and that the steaming coal of the British Columbia coast fields has been found to be most suitable to their needs. Some conception of what this means may be gained when it is known that the Canadian National Steamships shortly will have five or six vessels plying the Pacific Ocean and that it is likely that the Canadian National Railways will use the product of the Island on their locomotives. The latter assertion is founded on the knowledge that the coal of the Herewood Mine, Canadian Western Fuel Co., Nanaimo, has been tested on the railroad from Prince Rupert to the British Columbia boundary with splendid results. Having these facts in mind it would appear safe to say that much more Island coal will be sold in 1921 and that the fields have before them a period of unprecedented development.

After all, however, this improvement in market conditions has been gradually coming for some time. It is manifest in the returns as to output from the various collieries of Vancouver Island covering the last four or five months. When the officials statistics are available it will be found that production from the fields in question has been better in 1920 than in any previous year since 1912. And yet there is at present the anomaly of one of the Island collieries, the Pacific Coast Coal Mines Ltd., practically closing down. This Company, however, has been depending on the domestic market and the mild weather experienced on the Coast thus far this winter perhaps explains why the demand from this source has not been better maintained. The Company, too, is handicapped because of lack of tidewater facilities for the bunkering of large vessels. No doubt its difficulties will be overcome because it possesses fine coal-bearing lands, a producing mine, and, with coal about to assume again undisputed sway as King, may be depended upon to soon be on a producing basis.

TORONTO MINING STOCK QUOTATIONS.

Range of Prices during 1920 for active stocks on the Standard Stock Exchange, Toronto.

Silver.	High.	Low.	Last.
Adanac Silver Mines, Ltd.	7⅞	1¾	2
Bailey	6¾	3⅛	3½
Beaver Consolidated	75	25¾	26
Buffalo	80	80	80
Chambers-Ferland	15	3	5½
Cobalt Provincial	50	30	34
Coniagas	3.25	2.00	2.00
Crown Reserve	49	15	16
Foster	5½	½	½
Gifford	2½	1	1⅛
Great Northern	3⅝	1¾	2½
Hargraves	4¾	1	1⅜
Hudson Bay Mines	9	9	9
Kerr Lake	5.00	3.05	3.35
Kenabeek Con.	2	2	2
La Rose	54½	21	25
Lorrain Con. M. Ltd.	7	2	5
McKin.-Dar.-Savage.	73	20	24
Mining Corp. of Can.	2.25	85	1.00
Nipissing	13.60	8.10	9.00
Ophir	5	1¼	1½
Peterson Lake	24¾	8½	9
Right of Way	4	1	1¾
Silver Leaf	3¾	1	1½
Temiskaming	53	23	26
Trethewey	53	12½	16
Wettlaufer	4	1¾	2
White Res.	14	10	14
York	1		1
Gold.			
Apex	3⅛	1¼	1⅞
Atlas	40	10	16
Boston Creek Mines	22	8	10
Davidson Gold Mines	76	45	45
Dome Extension	50	18	40
Dome Lake	18	1⅜	2½
Dome Mines	14.60	10.25	11.75
Eldorado	¾		¾
Foley O'Brien	21	20	21
Frame Porcupine	15	14⅜	15
Gold Reef	5½	1⅞	2¾
Hattie Gold M. Ltd.	25½	19	25½
Hollinger Cons.	7.15	5.15	5.50
Hunton Kirkl'd G.M.	12	5	9
Inspiration	7	2¼	3
Keora	27½	11	15½
Kirkland Lake	81	36	36
Lake Shore M. Ltd	1.30	1.00	1.06
McIntyre	2.17	1.76	1.81
Moneta	17	7½	9
Newray Mines, Ltd	15	3½	3½
Porcupine Crown	37	15	17
Pore. Gold...EX.R	1	1	1
Porcupine Imperial	1⅜	½	⅜
Porcupine Tisdale	1⅞	1	1⅜
Porcupine V.N.T.	29½	16½	17½
Preston East Dome	1½	1½	2½
Pearl Lake	½	½	½
Schumacher	30	16½	16⅜
Teck Hughes	21	5	10
Thompson Krist	12	1⅞	6
West Dome	11	1⅜	8½
West Tree Mines Ltd	9	4	7⅞
Wasapika Gold M. Ltd.	11	9	9
Miscellaneous.			
Ajax Oil	47	20	25
Bothwell Oil	41	30½	41
Eureka	43	25	26
Petrol Oil	149	45	100
Rockwood Oil Gas	8	1½	2⅜
Vacuum G.	30	10	15½
The Petrol Oil	53	30	33

MINING SECURITIES ON MONTREAL EXCHANGE

Range During 1920, to Close December 30th, 1920.

	Open.	High.	Low.	Close.
Asbestos Corp. of Can.	81¾	103	64	82
Con. Mining & Smelting	28½	32½	15⅛	18
Dom. Steel Corp. Com.	75	79	39	43
Dom. Steel Corp. Pref.	80⅜	80⅜	62½	64
Dom. Coal, Pref.	94	94	77	77
Dom. Iron & Steel, Pref.	91½	92	69	69
Hillcrest Collieries	61⅜	61⅞	56	56
Intercolonial Coal	50	50	50	50
Nova Scotia S. & C.	67¾	67¾	42	42
Nova Scotia Pref.	105	108	99	99
Bonds.				
Asbestos Corp. of Can.	79	79	75	75
Dominion Coal	87½	90	82⅜	87¼
Dominion Iron & Steel	85⅜	86	75	76
Nova Scotia Steel	82	83	77½	77½

MONTREAL METAL QUOTATIONS.

Fair prices of Ingot Metals at Montreal, in less than carload lots. Range of Prices during 1920, and as at January 5th 1921 :

	First Half 1920.	Second Half 1920.	5th Jan. 1921.
Copper, Electro.	24.27	21.90	18.75
Copper, Castings	23.77	21.56	18.50
Tin	62.22	50.37	42.00
Lead	10.75	8.64	6.50
Zinc	11.34	9.50	7.50
Aluminium	35.20	35.00	35.00
Antimony	11.56	8.64	7.75

TELFORD GOLD MEDAL MERITED BY Mr. G. H. DUGGAN.

In announcing the awards for papers published without discussion in the Transactions of 1917-18, the Council of the Institution of Civil Engineers (Great Britain) state that a paper by Mr. G. H. Duggan, President of the Dominion Bridge Company, had merited the award of a Telford Gold Medal, but the author being a member of the Council of the Institution is for that reason ineligible to receive a medal.

The miners of Nanaimo, B.C., are elated over the success of the Barton First Aid Team in winning the Montizambert Trophy representing the Canadian Championship as well as other honors in connection with the country-wide competition conducted by the St. John's Ambulance Society. Arrangements are being made for a public presentation of the cups. Hon. Wm. Sloan, Minister of Mines, has sent personal congratulations to the Captain of the winning team. It is thought likely that this success will give a fillip to interest both in Mine-rescue and First-aid work in connection with the collieries of the Province.

Northern Ontario Letter

THE SILVER MINES.

The Cobalt Field.

Owing to the price of silver having appeared to settle down around from 60 to 65 cents an ounce over the year end, silver mine operators in Northern Ontario are confronted with the definite problem of finding some method whereby operating costs may be reduced. Silver production under present costs, and with the metal commanding current prices is profitable only in the case of the larger mines. For this reason some scheme must be decided upon to overcome the difficulty.

Regarding the power situation, no offical announcement has been made as to how long or to what extent the hydro-electric energy may be counted upon. The mining companies as well as the public at large are left to form unofficial estimates. In the reservoir above the power plant, water was recently understood to be about 40 inches above the dead-line. Since that time it is understood one log was removed, which leaves perhaps 30 inches as a fair estimate. This would carry operations well through the Winter. However, it is not clear what will be the result of two or three feet of ice forming during the Winter.

During January, the silver and gold mines of Northern Ontario will distribute over a million and a quarter dollars in dividends. The Nipissing and Kerr Lake represents the Cobalt district, these two companies having declared $675,000, of which the Nipissing accounts for $600,000.

Geological information resulting from deep diamond-drilling on the Crown Reserve mine has attracted considerable interest, and the Geological Survey, Ottawa, is making inquiry into the matter. This diamond-drilling hole has reached a depth of about 3,000 feet and is for the purpose of determining whether or not another diabase still lies at great depth. No official statement has so far been issued relative to the formations encountered but it is understood the drill will be continued to a still lower depth.

During the fiscal year ended Oct. 31st., according to the annual statement just issued, the Coniagas mine produced a greater quantity of silver than during either of the two preceding years. The output for the period amounted to 994,234 ozs., compared with 940,267 ozs. during the fiscal year ended Oct. 31st, 1919, and with 974,264 ozs. during the preceding year. Total production to date amounts to 28,188,762 ozs. The silver was mined and concentrated at a cost of 48.98 cents an ounce, added to which was a cost of 7.35 cents for smelting, refining, shipping and marketing. This made a total cost of 56.33 cents an ounce. During the year the company paid $500,000 in dividends, making a grand total to date of $10,040,000. During the year, the amount of broken ore in the mine was increased by about 13,521 tons. After spending $17,862 in connection with exploration work on the Agaunico property in Bucke township, and failing to get encouraging results, the company disposed of this property for $10,000 and thus redeemed part of the loss incurred. Concerning the Trethewey property which was purchased early in the year by the Coniagas, F. D. Reid, manager, has this to say: —"Ore milled from the property amounted to 7,482 tons, which yielded approximately 70,000 ounces of silver. There is still in the workings 5,000 tons of broken ore. The price paid for the property is assured, and it is anticipated that a fair profit will be made on the investment."

Drifting is under way with a small force of men on the Ruby Operative Cobalt Mines, formerly known as the Ruby Silver Mines. This work is being conducted at a point a little below the 100-ft. level, and encouraging quantities of silver is officially reported. The geological theory is being borne out and has given rise to optimistic views on the part of the officials of the company. The directorate of the new concern is composed of local business men.

With the payment of a dividend of 12½ cents a share on Jan. 15th, the Kerr Lake will have returned a total of $8,860,000 to its shareholders, the highest point of prosperity having been reached in 1910 when $1,200,000 was paid for the period.

Elk Lake and Gowganda.

Interest in the Gowganda field again centres around the question of possible rail transportation. Not only has the Northern Light Railways appeared to come to life again, but there is talk of the construction of a branch line of the T. & N. O. Ry., running south-west by north-east and passing through Westree on the West, to Gowganda, Forth Matachewan and connecting up with the main line at Swastika; thence, in an easterly direction through Kirkland Lake, to the Larder Lake district, and perhaps continuing on along the belt of promising geological formations in the province of Quebec. Under present conditions, the business through the area would not make the venture a profitable one, the possibility of it leading to the development of as yet unknown recourses being left to determine the wisdom of the scheme. For that reason it is believed no action will be taken by the Government. It is believed, however, the Kirkland Lake branch may receive favorable consideration, this requiring only about six miles of line, as compared with about 80 miles over the territory lying between Westree and Swastika.

Ore and Bullion Shipments.

During the week ended Dec. 31st. the O'Brien mine was the only company to ship ore, sending out one car containing approximately 64,000 pounds.

During the corresponding period the Mining Corporation was a heavy bullion shipper, sending out 99 cars containing 101,100 ozs.

Monthly Ore Statement.

Following is a statement of ore shipments over the T. & N. O. Ry., for the month ending November 30th, as submitted by Arthur A. Cole:—

Silver Ore.

(In tons of 2,000 lbs.)

Cobalt Proper.	Tons.
1. Beaver	30.00
2. Bailey	75.00
3. Coniagas	84.49
4. Dominion Reduction	41.50
5. LaRose	98.63
6. McKinley-Darragh	42.85
7. Nipissing	152.40
8. O'Brien	64.44
	589.31

The above shipments were made to the following Companies:—

Canada..

Deloro Smelting & Refining Co., Marmora	356.97
Coniagas Reduction Co., Thorold	145.93

United States.

American Smelting & Refining Co., Pueblo	43.56
American Smelting & Refining Co., Perth Amboy	42.85
	589.31

Price of Silver.

Nov. 11th Highest	82.875
Nov. 30th Lowest	68.125
Average	77.731

THE GOLD MINES.

The Porcupine District.

The position of the mines of the Porcupine district may now be estimated with reasonable accuracy. Uncertainty about the power supply has been largely removed, and it is now stated about 4,000 h.p. will be available throughout the winter. This is to be divided between the producers, the Hollinger getting over half the total, with the Dome getting about 1,000 h.p., the Porcupine Crown 250 h.p., and the McIntyre getting an allottment in proportion to consumption hereafter.

The Hollinger finds itself in quite favorable condition, due to having been able to develop an extra 1,000 to 1,500 h.p. from auxiliary steam equipment. This power added to the available hydro electric supply is expected to make it possible to treat an average of more than 2,000 tons of ore daily. This calculation is based upon an estimate of from 3,500 to 3,800 h.p., and it must be borne in mind that it was recently possible to treat about 2,300 tons of ore daily by employing about 1,000 h.p. With the arrival of Spring the Hollinger may be expected to increase all branches of operations up to full capacity and treat an average of from 3,000 to 3,500 tons of ore

daily. This would tend to indicate an output at the rate of upwards of $10,000,000 a year, as compared with the former highest record of around $7,000,000.

The allotment of power to the McIntyre has enabled that company to operate at about two-thirds capacity, and it is expected about 350 tons of ore may be treated daily, with the assurance that by about the middle of April it will again be possible to increase to normal rate of from 550 to 600 tons daily. The McIntyre is numbered among the dividend payers for the opening month of the new year. This company pays 5 p.c., amounting to some $180,000.

On Jan. 20th the Dome will also disburse a dividend of 2½ p.c., amounting to about $120,000. This company, in common with the other producers expects to be able to add greatly to its earning power with the arrival of Spring.

Officials of the Porcupine V. N. T. and the Northcrown Mines have been in conference with regard to the proposed consolidations of these two properties. At a meeting held last week in Montreal promising progress was made, and it is generally believed the merger will be consummated in due course. The territory involved comprises about 320 acres in a block adjoining the Hollinger on the south. Two mills, one of which is on the Northcrown and one on the Porcupine V. N. T. have combined capacity for treating close to 300 tons when operating at full blast. Recent developments on the Northcrown have been favorable. In a crossent from the 500-ft. level, two new veins have been found at a point about 1,400 feet from the shaft. The crossent is to be driven another 600 feet south to a vein formerly opened up through a drift from the adjoining Porcupine V. N. T. This intervening 600 feet is considered to have very promising prospective merit.

The Kirkland Lake District.

Good progress is reported in connection with the negotiations between the Teck-Hughes and the Orr Gold Mines, with the object in view of consolidating these two properties. It is planned to incorporate a new $5,000,000 company, with 5,000,000 shares of the par value of $1 each. Of this total, 2,500,000 shares would be allotted to the shareholders as well as bondholders of the Teck-Hughes while 1,500,000 shares would be distributed among the shareholders of the Orr. The balance of 1,000,000 shares would remain in the treasury. As regards the plan of operation, provided the merger goes through, it is understood the main shaft would be continued as quickly as possible to a depth of about 1,000 feet, and with drifts connecting up the workings of both properties at the desired levels. This would add greatly to the amount of ore immediately available, and would likely lead to the capacity of the mill being increased. Provision for this increase was made at the time the Teck-Hughes mill was designed, and the addition could be made with a minimum of difficulty.

During the coming week the crossent at the 250-ft. level of the Porcupine-Keora is expected to reach the veins indicated some time ago in diamond drill cores.

A mining plant for the King-Kirkland property in Lebel township has been placed on order and will be transported to the mines as quickly as possible. Surface work on the King-Kirkland opened up encouraging quantities of gold-bearing ore, and an aggressive campaign of exploration and underground development has been decided upon.

EDITORIAL

CRITICISM OF BRITISH AMERICA NICKEL CORPORATION.

A Select Committee on National Expenditure in London severely criticises the arrangement which the Board of Trade concluded with the British America Nickel Company, and suggest that an immediate effort be made to secure recovery of as much of the capital invested by His Majesty's Government as practicable, and that no further liability be incurred.

Criticism of arrangements made during war times are easily made in times of peace, and the fact that today "the world supply of nickel is in excess of the demand" is one that might have been pointed out by any schoolboy, who could also give the obvious reason. It is doubtless true, and we hope it may continue to be true, that the demand for nickel for armaments has declined since 1917, when the British Government concluded the arrangement that has culminated in a producing smelter and nickel refinery at Nickelton and Deschênes. "On purely commercial grounds", says the Select Committee, "the arrangement cannot be defended." Probably not, but then the British Empire was not being run on purely commercial grounds in 1917. General Currie has told us that the Allies were desperately put to it during 1917, and for any committee to criticise the policies of 1917 now that the war is won, and the cost is being counted, is the most futile kind of amusement. In all probability the reasons why the British-America Nickel Company did not make earlier delivery of nickel are capable of most satisfactory explanation, and it is quite certain that the existence of the Corporation's smelter and electrolytic refinery are matters for much satisfaction to Ontario and to Canada as a whole.

Nickel is a Canadian mineral asset of unique value. Its usefulness in peaceful arts has been obscured by its employment in armaments. There is no very striking tendency towards disarmament in the World today, and we have unfortunately no reason, reviewing human history, to assume that wars have ceased. At the same time, the nations have learned once again that war is a fool's game, and for a time it is probable we shall have peace and progress in the arts. We may expect to see the uses of nickel multiplied as the public learns that the metal is available in quantity, and as manufacturers develop its many advantages, not only as an alloy, but for its intrinsic merits of non-corrosibility, susceptibility to polish, and its unique combination of the artistic beauty of silver with the strength of iron.

From a Canadian point of view, any suggestion that the British Government's capital, when invested in a nickel deposit, having its own smeltery and a most modern type of refinery in Canada, is wrongly employed, is an uncalled-for imputation upon the country, and shows a persistence of that inability of overseas critics to understand the real reasons for just such a controlled source of nickel supply within the Empire; reasons which led to some unfortunate deficiencies in our metal control before and during the war, and in regard to which other British Dominions, such as Australia, have taken a definite and determined attitude.

"Purely commercial grounds" almost led to the defeat of the British peoples, which would have meant the dividing of their heritage among the robber nations of earth. Nothing is cheap, nothing is profitable, that puts commercial grounds before national defence. This country ought to know that, and does know it, by token of many graves overseas, and many taxes over here, neither of which are desirable, even on "purely commercial grounds."

THE NEW DIRECTOR OF THE U. S. BUREAU OF MINES.

The New Director of the United States Bureau of Mines, succeeding that distinguished physicist Dr Cottrell, will have the good wishes of many confrères in Canada, and many friends overseas. Since 1900, Mr Bain has been a corresponding member of the Canadian Institute of Mining and Metallurgy, his address at that time being Shanghai, China. He was one of Herbert Hoover's assistants in Belgian Relief Work during the war, that expression of national sentiment which antedated the actual entrance of the United States into the campaign against the Hohenzollern concept of human progress, and [illegible] inevitable lifting of a siege that was an contemptuous

thrown down as any in history. The manner in which the Canadian Institute co-operated with the American Institution of Mining Engineers in this work under Mr. Hoover's direction is a pleasant memory of fraternal oneness in a good work.

Mr. Bain was formerly Editor of the "Mining and Scientific Press" of San Francisco, and later Editor of the "Mining Magazine" of London, and he is a globe-trotter of cosmopolitan experience.

The United States Bureau of Mines is an institution of value not only to the country it primarily serves, but it has always extended courteous aid to the mining industry in Canada.

The Bureau, and its new Director, have, we venture to state on its behalf, the good wishes of the mining profession on this side the line that has no guns, and is delimited by good faith and mutual respect.

THE NOMINATED PRESIDENT OF THE INSTITUTE.

The "Bulletin" announces in the January issue that Mr. C. V. Corless, of Coniston, is nominated as President of the Canadian Institute of Mining and Metallurgy for the 1921-1922 term. No better choice could have been made. Mr. Corless's advocacy of the study of the human element as an aid to corporate efficiency was singular and lonesome in the ranks of the industrial managers of Canada, when his voice was first raised, but he has since had many followers and his writings have attracted more attention in recent years than any other contributions to the Transactions of the Institute. Recently, in these columns, it was stated that the name of our Sage of Coniston, in recent industrial annals of Canada "led all the rest". At that date there was no inkling that Mr. Corless would be the elected head of the Institute, and we take it that his selection for the highest honor the Institute has in its bestowal indicates not any foreknowledge on our part, but an unanimous feeling that Mr. Corless has added lustre to the Institute and is the proper person at this time to give it leading also.

NON-EFFICIENCY OF COLLIERY MANAGEMENTS REFUTED.

At the time of the Sankey Coal Commission in Britain the miners' leaders explained the decreased individual production of the mineworkers by attributing it to poor, old-fashioned mine equipment, state of disrepair of colliery machinery, lack of mine cars and inefficiency of the technical management of the coal mines. These men also accused the mine managements of the neglect of safety of life. There is no doubt that the Commission, and the public also were impressed by this persistent campaign, to which the managers could offer little defence before a non-technical tribunal, in connection with conditions that are to no small extent matter of opinion and partial debate.

The singular part of this campaign of calumny—for that was what is amounted to—was that it was not confined to Britain, but was heard in Canada, in Germany, the United States, Australia and in France, word for word.

The sequel is interesting. In every one of the countries mentioned the individual production of coal has greatly increased, with no changes in equipment or management, but with a decided change in the mentality of the workers.

It is unfortunate, however, that the lies of propaganda never catch up with the truth, and the public is still under the impression that colliery managements are inefficient, and that accident rates are unnecessarily high. The precise reverse is the truth, and the whole incident is an interesting example of how helpless an industry can be made when those engaged in it conspire to disseminate a lie.

A NEW COMPENSATION ACT FOR QUEBEC.

It is satisfactory to know that the shortcomings of the present Workmen's Compensation Act in Quebec are generally realised, and that the Canadian Manufacturers' Association is interesting itself in the drafting of a new act that will be less out of line with the workmen's compensation legislation of the other provinces and that of most of the States in the United States. The great objection to the present Quebec Act, as we have maintained on a number of occasions in these columns is the disproportionate amount of litigation it entails, with correspondingly unnecessary disbursement of legal fees, entailing lessening of the amount that eventually goes to the injured claimant or his dependents, and generally embittering all relations between industrial corporations and their workmen.

The general principle of the equity of workmen's compensation is too well-established to attack, and it is in every way desirable, from the viewpoint of employer and workman, that compensation payments should suffer no diminution in transmittal and that every possible source of dispute should be avoided. These are precisely the points that the existing Quebec Act does not ensure, and a new act is a long time overdue.

RAW MATERIALS OF THE STEEL INDUSTRY IN 1920.

The statistics available at the year end show the following production of domestic mines during 1920, as compared with 1919 and 1918 :

	Short Tons.		
	1920	1919	1918
Iron Ore	120,000	197,170	211,608
Coal	16,000,000	13,681,218	14,997,926
Pig-Iron	1,080,000	917,781	1,195,551
Steel ingots and castings	1,220,000	1,030,342	1,873,708

With the exception of the production of iron ore, which is to be credited almost entirely to Ontario, the figures are encouraging. A very small proportion of the welcome increase in coal production can be credited to consumption in steel-making processes. In Nova Scotia, the coke tonnage showed a decrease from that of 1919. A certain amount of coal has been used in the steel and iron trades in the West, but this, of course, is as yet inconsiderable in quantity.

The continued decline in the production of native iron ore, which now stands at the lowest point in twenty years, is disturbing, but, despite much research and many proposals for state assistance of domestic iron-ore production, the problem has received no solution on economic grounds. From a patriotic viewpoint, the situation is distinctly dangerous, but, so far, the attempts which have been made by Canadian steel companies to utilise domestic ores have received the scantest recognition from federal or provincial governments. On strictly economic grounds, this attitude is probably an irreproachable one, but economic considerations are only one phase of national life, and if Canada were to frame its policies entirely on economic grounds it would logically lead to placing our seat of government in that country where we get our raw materials. However, it has not yet been demonstrated that cheapness is the main reason for our national existence. It is quite possible also that nothing is cheap that is bought abroad when it can be produced at home. Coal and iron are two things that are cheap at any price in times of national necessity, and it may well follow that they are dearly purchased at any price abroad if thereby our own resources are unutilized and their existence practically negatived.

A year ago we ventured a hope that the revelation of Canada's deplorably subservient position in regard to supplies of coal and iron, and our exchange rate, which had resulted from the strikes of steel, coal and railway workers in the United States, would, if the independence of the Canadian spirit were interpreted as it is usually accepted and believed in—"do more to stimulate our native production of coal, iron and gold, than millions of government subsidies."

An increase of 2½ million tons in our coal production indicates that the interpretation was not a false one, but, in regard to iron-ore mining, the patriotism of Canadian steel companies has exceeded reasonable limits, and has gone largely unrewarded and unrecognized. From "Iron & Steel of Canada"

WALTER H. PREST, HALIFAX.

Walter H. Prest, for many years associated with the mining industry in Nova Scotia as surveyor and civil engineer, died on Christmas Day. He was formerly a member of the Mining Society of Nova Scotia, and was the author of a handbook for metal miners

SAVING MINE TIMBERS FROM DECAY.

(Note by Forest Products Laboratory, U.S. Forest Service.)

Enormous quantities of valuable timbers are being placed in the coal and metal mines of this country without any preservative treatment against decay. That the life of these timbers might be greatly lengthened by the injection of certain chemicals has been proved by the U. S. Forest Products Laboratory in numerous service tests. In 1910 the laboratory installed in an Alabama mine untreated timbers and timbers which had been treated with coal-tar creosote. Ten years later all the untreated timbers had been removed because of decay, while 80 per cent of the creosoted timbers were still sound and none had decayed to a point where removal was necessary. This is only one of the many records obtained by the laboratory which should induce every mining company to install some sort of wood treating plant.

At least three preservativves have been found suitable for mine work. These are coal-tar creosote, zinc chloride, and sodium fluoride. Creosote is the most effective in preventing decay. Timbers thoroughly impregnated with it are likely to resist decay until they are crushed or worn out. Occasional objection is made to the possible fire hazard of creosoted wood, but long experience indicates that the additional fire risk is very small. Zinc chloride and sodium fluoride are odorless, and if anything they tend to reduce the inflammability of wood. They are cheaper than creosote and although they do not give such permanent protection they greatly increase the life of timbers. Coal-tar creosote may be applied by the brush, dipping, open-tank, or pressure methods. Zinc chloride and sodium fluoride may be injected by the steeping, open-tank, or pressure methods. The cost and effectiveness of the methods of treatment increase in the order given. The saving possible with any of them is so great that it will pay every mine to adopt the use of some preservative on permanently located timbers.

ORDER-IN-COUNCIL DESIGNED TO AID DEVELOPMENT OF FLIN FLON PROPERTY, MAN.

(Published in the "Canada Gazette" of 25th Dec., 1920.)

Certified Copy of a Report of the Committee of the Privy Council, approved by His Excellency the Governor General on the 16th December, 1920.

The Committee of the Privy Council have had before them a report, dated 10th December, 1920, from the Minister of the Interior, stating that by Section 103 of the regulations for the disposal of quartz mining claims on Dominion lands in Manitoba, Saskatchewan, Alberta, the Northwest Territories and the Yukon Territory, approved by Order in Council dated the 25th May, 1917, it is provided that all grants and leases issued under the provisions of these regulations shall be subject to the provision that all ores or minerals mined from locations described in such grants or leases shall be treated and refined within the Dominion of Canada so as to yield refined metal or other product, suitable for direct use in the arts without further treatment; in default whereof the grant or lease issued for such lands shall be and become null and void and the said lands shall forthwith revert to and become revested in the Crown freed and discharged of any interest or claim of any other person or persons whomsoever; and shall be open to disposal in such manner as the Minister may decide.

The Minister further states that representations have been made to the Department of the Interior that a syndicate, of which Mr. Charles Ayer, of New York, is manager, has acquired under option agreement a number of mineral claims at Flin Flon Lake, in the province of Manitoba, comprising an area of about 1,500 acres; that by means of the diamond drill a large body of low-grade ore, containing copper with a small percentage of gold and silver, has been developed at an expenditure of about six thousand dollars; that should the option be exercised, a railway for a distance of approximately one hundred miles will become necessary; that it will also be necessary to erect a mill and smelting plant, at a cost of abont three million dollars, and to develop a water-power involving thirty-five miles of transmission line, at a cost of not less than two million dollars. The mine, if brought to the producing stage at the tonnage estimated would employ not less than one thousand persons, and to construct a railway and fully equip the mine would occupy a period of probably five years.

It has also been represented that in treating these ores a crude product, known as blister copper, containing about ninety-eight per cent of copper, gold and silver values, will thus be obtained; but that further refining by the electrolytic process can only at present be accomplished in one place in Canada, namely, the Trail Smelter, in British Columbia.

In order to complete the refining process in Canada, it would become necessary to ship the product west to Trail for refining, and return the refined product to the eastern markets, involving an additional haul of about 2,500 miles, and, therefore, greatly added expenses.

In view of the greatly increased cost of final treatment at the only smelter in Canada at present equipped for the work, and the fact that the mill and smelter which the syndicate referred to proposes to erect in Northern Manitoba will be of great public benefit in the reduction of ores of that and the adjoining province to a crude product known as "blister copper," containing about ninety-eight per cent refined metal, the Minister recommends that permission be granted to export for final treatment such blister copper, the product of the mill and smelter to be erected in connection with the mining property above referred to, for a period of ten years, unless in the meantime, in the opinion of the Minister, facilities have been established in Canada for the electrolytic refining of such product as cheaply and efficiently as elsewhere.

The Minister submits that by an Order in Council dated the 13th December, 1910 (P.C. 2102), provision was made that no royalty shall be charged on the products of coppermining locations acquired under the provisions of the regulations for the disposal of quartz mining claims on Dominion lands in Manitoba, Saskatchewan, Alberta, the Northwest Territories and the Yukon Territory, for a period of ten years,—that is, up to the first day of January, 1921—but that provision be made that on and after that date locations acquired under the provisions of the said regulations shall be subject to whatever regulations may be made in respect of royalty.

The Minister, therefore, further recommends that the product in copper of the aforesaid mineral mines at Flin Flon Lake in the said Province of Manitoba, in which the gross recoverable values average less than ten dollars per ton, and which are reduced to blister copper at the mill and smelter hereinbefore mentioned, be exempted from royalty for a period of ten years from the first of January, 1921, but that at the expiration of such period the product of such claims shall be subject to said regulations as may then, or thereafter, be enforced with regard to royalty.

The Committe concur in the foregoing recommendations and submit the same for approval.

RODOLPHE BOUDREAU,
Clerk of the Privy Council.

23rd ANNUAL MEETING, C. I. M. & METALLURGY.

Ottawa, March 2nd to 4th, 1921.

The "Bulletin" announces that arrangements for the Ottawa Meeting are well under way, and gives further particulars as follows:

"During the opening session, following the registration of members and guests, addresses will be delivered by prominent Government officials and the President of the Institute. The usual preliminary estimates of the mineral production for 1920 will then be presented, after which matters of general business will be submitted for consideration. These will include the report of the Publication Committee on the future publication of the "Bulletin" and the proposed amendment to the by-laws respecting the appointment of an executive Committee. In the afternoon the question of Canada's iron and steel industry will be discussed and papers on this subject will be presented. The customary "Smoker" will probably be held on the evening of the first day.

The sessions of the second day will be devoted largely to the non-metallic minerals, coal, and general mining and metallurgical practice. For the evening it may be possible to arrange a theatre party if the Entertainment Committee considers the matter favourably.

The arrangements for the final day will include the presentation of papers on economic geology in the morning, and excursions in the afternoon, including an inspection of the Ottawa Branch of the Royal Mint, if arrangements can be made, or a visit to the refinery of the British America Nickel Corporation at Deschênes, Quebec. The Annual Dinner will be held in the Chateau Laurier during the evening.

INCOME TAX AND THE INDIVIDUAL.

The Royal Trust Company of Montreal will send to anyone making application a copy of "The Income Tax and the Individual" which our readers are recommended to peruse. The 1920 Act contains some unprecedented features in Income Tax requirements. The taxpayer must not wait until he is called upon, or officially notified, but must personally obtain the necessary forms, fill them out, and accompanied by at least a quarter of the tax, self-calculated, must remit the money and the forms before 30th April. The penalties for non-compliance are of the most drastic character. Certain allowances are made which it is necessary to fully understand when making out returns. Some of our readers — but not many — will be interested to know that if they have an annual income of one million dollars the Government will collect $696,349 of it as a tax. The Royal Trust Company's little manual is very clear, and information such as it contains is quite necessary to every person whose income exceeds one thousand dollars per year.

A 300-ton Electric Shovel in Open-cut Quarrying

Employment in Michigan Limestone Quarries.

The "General Electric Review" for December 1920 contains a description by C. R. Fisher, Electrical Engineer of the Michigan Limestone & Chemical Company, and H. G. Head of the General Electric Company of Detroit describing the design and application of electric shovels of unusually large capacity to open-cut quarrying.

Mr. Carl D. Bradley, the President & General Manager of the Michigan Limestone & Chemical Company contributes the following statement to the "Review" regarding the evolution of the idea of using large-scale electrical shovels.

"About ten years ago the Michigan Limestone & Chemical Company purchased a tract of several thousand acres extending for several miles along the shore of Lake Huron and containing limestone which the company intended to develop commercially for blast furnaces, chemical plants, etc. The limestone lay close to the water front and delivery to steamers was comparatively easy and economical with proper facilities.

In order to establish a market for its product the company made sales contracts at very low prices which required very careful consideration of all details relating to construction and operation of the plant in order that costs might be kept within the limits prescribed by the selling prices obtainable. Large scale operations were involved and many engineering problems had to be solved. The general problem was to drill, blast, quarry and transport the stone to the mill and there crush, size, wash and convey it to storage, and thence load it into steamers.

Changes were necessarily made in the plant from year to year, and the difficulty of handling the great tonnage was finally overcome by the installation of large crushers, large screens and similar equipment. The loading facilities have developed to a point where steamers of 13,000 gross tons are loaded in six hours, and the management is convinced that theoretically the problem of quarrying the limestone is no different from that of handling and loading it. However, no adequate means of geting large output from open cut quarry operations at low cost had been developed, and therefore attention has lately been forced upon production at the quarry.

Quarrying operations are being conducted against the natural bluff of limestone which is now in excess of one and one half miles long and more than one hundred feet high, requiring two benches. This bank is too high for the economic and safe operation of the 100 ton steam shovel, and because of this fact and the high costs of labor and material the management has become deeply interested in the application of large digging and transportation units which will permit the quarrying operation to keep pace with the mill and loading system. If a digging machine can be had which will take care of 5000 tons of material in ten hours and operate satisfactorily under this punishment day in and day out, the problem is approaching solution, with a resultant economy in all operations.

For the future the quarry will approximate two miles in length in one face with five large electric shovel units working against it, served by locomotives and cars of comparable capacity. One man will operate the shovel and another the train, and the tonnage per man hour will be multiplied by five over that of present day equipment. With the introduction of the 300-ton electric shovels, quarrying on a large property such as that under consideration is reduced to a scientific basis.

The modern trend in industrial development has been toward increasing the efficiency of the individual, or in other words, the rate of commodity handling per man hour; only by such a test have we the right to measure accomplishment. While the management has been able to satisfactorily increase the rate in crushing limestone, in screening, conveying and loading it, until recently efficiency at the digging end has not kept pace with that of other operations, and it was specifically for the purpose of improving this performance that the 300-ton electric shovel was installed. The results that have been accomplished by the new equipment have been most gratifying, and it is firmly believed that through the proper application of these large electric shovels the quarry operations will be made entirely satisfactory."

The shovel described is a model 300 E. Marion electric shovel, fitted with 80 ft. boom, to give a digging radius of approximately 54 ft. at the rail, and 99 ft. at 40 ft. above the rail. The dipper now being used has a capacity of six cubic yards, but ultimately a capacity of eight cubic yards is proposed for the dipper. A detailed description of the electric drive and control, and figures of performance and cost is given, and the article is well worth consulting by those who have large-scale digging operations in charge.

COLONEL E. G. PRIOR, P.C.

The late Colonel E. G. Prior, the Lieutenant-Governor of British Columbia, whose death occurred during December, had many connections with the mining industry in that province.

Colonel Prior was born in Yorkshire in 1853, was educated at Leeds Grammar School, and was articled as a pupil in mining engineering to a Wakefield mining engineer, Mr. J. Tolson White. He came to Nanaimo in 1873 and took a position as engineer and surveyor with the Vancouver Coal Mining Company, living in Nanaimo until 1878, when he became Government Inspector of Mines. Afterwards he went into a general mercantile business, and was very successful. His interest in military affairs was great. He commanded the Canadian Rifle Team at Bisley in 1890, and was twice President of the Dominion Artillery Association. In 1897 he was one of the Canadian Contingent at the Queen's Jubilee. He was a life member of the North of England Institute of Mining and Civil Engineers. He was buried with full state and military honors.

STATISTICS OF ORE RECEIPTS AT TRAIL SMELTER.

The Trail Smelter of the Consolidated Mining and Smelting Company of Canada received during the year up to 21st December 366,799 tons of ore, of which 318,981 tons was from the Company's own mines. The receipts, apart from Company mines, included treatment material from 97 mines of which 5,957 tons was in the form of concentrates. There was in addition 2,703 tons of zinc concentrates. The Mundy Mine sent from The Pas 7,536 tons, and one shipment of 3 tons came from Mayo.

DR. JOHN A. ALLAN, EDMONTON, ALBERTA.

(From Bulletin of C. I. M. & M.)

Dr. Allan was born at Aubrey, Quebec, which lies on the southwestern side of the Chateauguay valley in the St. Lawrence post-glacial marine basin. Brought up on a farm situated near the Champlain fault, his attention, while a boy, was directed by this peculiar structural feature towards the study of geology. Later, when attending Huntingdon Academy, the collecting of fossils from the Ordovician limestone in that neighbourhood engaged his attention. After a course at McGill University he graduated in 1907, and a year later obtained the degree of M. Sc. In the autumn of 1908 he secured a fellowship at the Massachusetts Institute of Technology, and in 1912 obtained the degree of Ph.D. His thesis for this degree forms part of Memoir 55 of the Geological Survey of Canada that includes the results of his investigations on the Ice River Valley near Field, B.C.

In 1912 Dr. Allan received an appointment as lecturer in geology and mineralogy at the University of Alberta, organizing the work of this department and beginning the collection of material for the present excellent museum at the University. In the following year he was made Professor of Geology, which position he has since held. Since 1906 he has been connected at various times with the Geological Survey in the field, and has also carried on consulting work for several years. Research has also taken up a great deal of his time and his published contributions to scientific literature include several on general and economic geology, physiography and mineralogy. Recently he has undertaken the systematic investigation of the mineral resources of the province for the provincial government and his "First Annual Report of the Mineral Resources of Alberta" was published last spring.

Dr. Allan joined the Institute in 1913 and was elected to the Council in 1919. He has always taken the keenest interest in the Institute's activities and was instrumental for the formation of the Northern Alberta Branch in April 1918. He was the first chairman of the Branch and occupied that position until January 1920. Dr. Allan is also a Fellow of the Geological Society of America.

APPLIED SANITY.

At this season of goodwill it is timely to quote from a letter just received from a Californian mining engineer residing in London and practising his profession there. We asked him to what extent the sentiments evoked by the War have restricted the scope for American mining engineers among British operators abroad. He replies that he has "met with only the best of treatment, most courteous in every respect." He had been elected a director of a company and later he had been appointed consulting engineer, the latter being the more profitable, and more important, appointment, of course. There is no "anti-American feeling" in mining circles in London; indeed, he adds, an Englishman has asked him to enter into partnership with him, and that, he suggests, the other man would not have done if there had been any prejudice against Americans. We mention this to correct an impression to the contrary that seems to obtain among some of our friends in the profession. Whatever little fusses may arise between the newspapers — not the governments — on opposite sides of the Atlantic, and however much pro-German and Sinn Fein propaganda may unite in striving to make trouble between the English-speaking peoples, we are glad to believe, and to know, that the English-speaking mining engineers are comrades all, pleased to work with one another, and willing always to extend the hand of good-fellowship, whether it be done under one or the other of the two flags that have led the way in exploring and developing the mining regions of the world from Cape Nome to Cape Leeuwin, from the Gila to the Vaal, from Chuquicamata to Cusihuiriachic, from Pike's Peak to Mount Morgan.—"Mining & Scientific Press."

NOVA SCOTIA COAL MINING NOTES.

The production of the Dominion Coal Company's Cape Breton collieries in December was 285,996 tons, comparing with 274,969 in December 1919, and being smaller than November 1920 figures by 10,000 tons. The reduced scale of operations at the Dominion Steel Company's plant lessened the coal requirements, and some difficulty is being experienced in finding a market for the surplus coal at this time of the year. While a considerable tonnage of coal will be stored in the banks, yet this will not take all the coal produced, and the business outlook is not sufficiently clear to justify an unusually heavy banking programme, particularly in view of the action of the Railway Commission in imposing an embargo on export shipments last Summer.

The following table shows the production of the individual collieries of the Dominion Coal Company in Cape Breton Island during the year just ended, and for comparison the figures for 1919 and 1913 are also given:

	1920	1919	1913
Phalen Seam Mines			
1	338,561	331,619	533,599
2	550,035	613,994	810,627
3	.....	.....	118,206
4	330,049	330,553	393,650
5	105,901	84,326	220,719
6	258,101	227,025	260,990
Hub Seam			
7	.....	.....	221,816
Harbor Seam			
8	.....	.....	80,033
9	277,462	270,094	393,591
Emery Seam			
10	125,211	103,681	198,115
11	174,813	157,431	44,425
24	48,108	449	.....
Victoria Seam			
12	178,939	188,394	352,590
14	204,839	182,855	415,927
17	22,037	1,341	25
Lingan Seam			
15	123,442	143,690	221,250
16	157,003	157,997	259,173
Birch Grove Seam			
21	172,075	146,433	153,054
22	194,387	147,726	61,359
Total,	3,260,963	3,087,638	4,739,149

Commenting on the foregoing figures, it may be noted that in regard to the mines on the three upper seams, namely and inorder of depth, the Hub, Harbor and Phalen seams, three collieries, Nos. 7, 8 and 3 have been closed down, and one other, No. 5 is approaching exhaustion. The land area in these seams is all taken up by the existing mines, and no new collieries are required. Large future expenditures are likely, however, for the winning of the submarine continuation of these seams, and new openings at the shore will be required. One of these openings between No. 1 and 2 Collieries, is now in process of completion. No. 7 Colliery, on the topmost seam was closed, but not through exhaustion of the coal. As the coal is of good quality and as there is a large untouched submarine area the mine will some day be re-opened.

The percentage of coal mined from the Emery Seam is steadily increasing, and as there is a large unworked field of this seam under the land area, and a virgin submarine extension, additional openings will be made in the future. The seam underlies the Phalen at a depth of about 160 feet. No. 10 colliery is situated on the site of the Phalen Mine 5 (Reserve Mines), and No. 11 on the site of Phalen 3, in each case utilising existing plant and houses for the workmen. Similar utilisation of plant and houses may be expected at Phalen and Harbor seam mines that have not yet been extended downwards to the Emery Seam.

The Birch Grove mines are in the Morien Basin, and there is room for still other slope mines on the seam being worked, which is not definitely correlated with the seams of the Glace Bay Basin. In this district the Dominion Coal Company is preparing to work the submarine tract of coal, which contains a number of seams, and is re-fitting and unwatering the Morien shaft, formerly operated by the North Atlantic Collieries, and now owned by the Dominion Coal Company. Should really extensive submarine operations be projected in this district—as they will be some day—larger and deeper shafts will be required.

The mines on the Victoria Seam are in the Waterford district, and are now all submarine operations. The Victoria is definitely correlated with the Harbor Seam on the Glace Bay side, but not as yet with the seams on the North Sydney shore of the Harbor. There is room for additional collieries on this seam. These remarks apply also to the Lingan collieries, this seam being equivalent with the Phalen at Glace Bay.

The equivalent of the Emery Seam, and seams below it, are present in the Waterford area, and a number of mines will some day be opened on these underlying seams in the rear of the existing mines. In the same way the equivalent of the Hub Seam in the Glace Bay district overlies the Victoria (Harbor) in the Waterford district and is being tapped by an ascending cross-measure drift out of the Victoria seam.

Just how far inland the seams below the Emery extend, or what course their outcrops take is not definitely determined, as the amount of coal available has been sufficient to prevent much interest being taken in the outlying districts of the lower seams. It is probable, however, that future generations will regard the unworked seams of the Sydney coalfield, under the land areas and at greater depths than those now worked, as constituting a much more dependable and more accessible reserve than the unknown submarine extension of the seams as a whole, and this statement is not intended to depreciate the great value of the submarine coal.

This inland extension is delimited in fairly accurate manner by the outcrop of the Millstone Grit series, but the exact course of the crops within this area is not precisely mapped.

A modern transmission line will be run from the Dominion Steel Company's new powerhouse at Sydney to serve a number of the Dominion Coal Company's collieries in the vicinity of Glace Bay. The poles are to be spaced 300 ft. upon concrete pedestals. Up to recently it has not been possible to put the lines of the Steel and Coal companies in electrical connection because of a difference in frequency in the two systems, but in later additions to the Steel Company's generating capacity the extension of spare current to the collieries has been borne in mind.

BRITISH SELECT COMMITTEE CRITICISE BOARD OF TRADE ARRANGEMENT WITH BRITISH AMERICA NICKEL CO.

The Montreal "Gazette" under date of December 31st has the following London cable.

The report of the select committee on national expenditure severely criticizes the Board of Trade in connection with the nickel deal it made early in the war. The deal was concluded with the Kristiansand Nickel Raffienerings-weerk and with at least one other Norwegian company, and the total expenditure was £1,030,000.

On purely commercial grounds, says the select committee, the arrangements and payments made cannot be defended. They have let the Government in for big liabilities.

"To facilitate negociations with the Kristiansand Company," says the report, "His Majesty's Government concluded with the British American Nickel Corporation a trading contract under which they agreed to take nickel ore from the corporation for ten years from 1917, 6,000 tons a year, at the market price, with a Government option to call for 1,000 tons at a fixed price of £125 a ton. The Government also subscribed in 1917 for $3,000,000 six per cent. first mortgage gold bonds in the corporation at a cost of £620,000, the entire sum payable in five annual instalments from January 1, 1920. There has been no delivery of nickel under the contract and, as a fact, the world supply of nickel is in excess of the demand. No interest on the loan of £620,000 has been paid nor any instalment of the redemption. As the corporation have failed to carry out their agreement, the committee recommend an immediate effort to recover as much of the capital as practicable, and that no further liability be incurred in the matter."

BOOK REVIEW.

THE HUMAN FACTOR IN INDUSTRY: By Dr. Leo. K. Frankel and Dr. Alexander Fleisher, respectively Third Vice-President and Assistant Secretary of the Metropolitan Life Insurance Company, with the co-operation of Laura S. Seymour. Cloth Boards. 5½ by 8 inches 366 pp. with list of references and Index. Price $3.00. Published by the Macmillan Company of Canada, Toronto.

This work is designated to be used as a text-book in service and personnel management technique. The arrangement of contents is by subject and not by industry, in itself a commentary on the growth of literature of this class. Interpolated throughout the chapters are numbered references to the literature on the subject under discussion, which, as the chapter deal with such subjects as "Hiring & Holding", "Education", "Refreshment & Recreation", make the collected references appended to the volume a reasonably good selected bibliography.

Under the significant heading of "New Names for Old", is is pointed out that the responsibility of the employer for his workmen, or to use now archaic terms, the solicitude of the master for his man, was fully realised under the guild organizations of medieval industry. Later submerged by the dominance of the machine, we are today re-discovering forgotten duties and giving them a modern paraphrase. The authors query why the value of human labor has been more appreciated in the past decade than in former years of machine industry, and while they state that no one reason can be given, they give a number, the resultant of which appears to be that neglect of the individual has been found not to pay.

The work throughout does not stress the religious or altruistic side of human dealings, but explains that in the last analysis the value of this factor in industry will be measured by the employer in terms of increased production, and, by the employee, by the opportunities which are accorded to him for personal development, both financial and spiritual. In short the yardstick will be: "Does it pay? Is it worth while?" This is putting the matter in terms of lowest denomination, but also in terms of final and permanent expression. It is this dispassionate treatment, backed by definite instances of successful application, that gives this book its value.

As a handbook to officers of industrial corporations, engaged in personal work, it strikes us as a most valuable compilation, and it contains definite information on such subjects as housing, technical and part-time education, food catering for employees, insurance, sickness, death, and other benefits, charts on the organization of employment departments and medical services, and, as previously stated, a satisfyingly complete bibliography.

One penetrating phrase we may quote from the book, dealing with development of the employee, once he has been hired and inducted into his work, is that "a careful policy of promotion makes of the employee's personal ambition 'a centripetal instead of centrifugal force' in the industry". The secret of the success of many well-known executives of industry lies in their appreciation of this principle.

A Montreal Letter

By ALEXANDER GRAY.

Future of Silver.

Quite a few years have elapsed since that picturesque character—H. A. Tabor—depicting his financial status said to me:—

> "I have a couple of silver mines—but that makes me worse off than broke—so I'm working a bit of a gold prospect up here at Blackhawk."

The ex-Governor and ex-Senator—one of the "Bonanza Kings" of Colorado—and made such by silver—hardly exaggerated the position of those who were left with white-metal mines on their hands.

Not many "Silver Kings" were created after Bankers decreed there must be monometallism—until the Cobalt crop of them rapidly matured. Silver was somewhat anathema. The "Silver Barons" were as roundly denounced as the "Coal Barons" and modern "Profiteers"—so the metal was demonetized—and there is not much difference in its price to-day and when Cobalt was discovered. High finance banned it. Mexico and the Orient adhered to it, but it is so susceptible to fluctuations in trade and commerce that it is begrudgingly conceded to be suitable only as "loose change": for genuine silverware is a rarity. Even the Flowery Kingdom is contemplating the gold standard. India is not taking so much for ornamentation of its people. Latterly

the Imperial Government debased their subsidiary coinage. Switzerland plaintively declares it has an over-supply of silver belonging to affiliated countries whose depreciated exchange makes it difficult to trade with them. France is substituting a bronze-aluminum alloy for some of its franc pieces. Germany is not particular, since its marks are in the discard. So it goes. Asiatic countries finding themselves over-extended and without commensurate European outlets for their products, had to liquidate their holdings of silver. This, and earlier pressure caused by speculation in the metal itself, sent silver to 59¾ cents, the lowest price since the outbreak of war. That it has recovered and is higher than the average for 1916, may or may not mean that the flurry is over. If it takes as long to restore the equilibrium of international exchange as it has to arrange Reparations, silver may lack buoyancy. It is completely subject to trade conditions; so much so that it would seem as if something should be done to encourage production of the metal, instead of having the mines of Canada, the United States and Mexico in periodic ferment. While the current market price, plus the premium on New York funds, is acceptable to those who have high grade enabling them to purchase at a more or less nominal cost, not many mines are in that fortunate situation. The generality of silver and copper mines cannot make their metals for prevailing markets, copper being enmeshed in widespread business depression, however temporary.

Gambling in silver on trade fluctuations is a habit with Asiatic merchants, gyrations of the rupee being a source of profitable amusement. If the coinage of silver is going to be restricted, partly because crippled, convalescing countries cannot buy it and prefer "any old thing" for day-to-day bartering, the only recourse suggested by unsolicitous capitalists is that "silver can go into 'the movies,'" where it is availed of in the making of films. That, however, might be another false sense of security, of which silver producers have had more than their share. In reality, owing to the strained conditions resulting from waste and worse, not a few contend "an international currency that will be legal tender the world over," is the only permanent solution. General Smuts has suggested this, irrespective of wars or rumors of war; yet the fiscal millenium hardly is in sight. Creditor nations are indisposed to confide so much of their prestige to those with whom they were, or are at war. For that matter "Commerce is War." Canadian silver sold in the States at the market, brings the premium on New York funds, but Canadian silver coins circulating among neighbors along the border are at "the usual discount." Smuts foresees a fiscal fellowship no conflict could destroy. The disruption of it would mean immediate bankruptcy. With such an ideal in effect, silver right be stabilized and producers freed from recurring reverses. A monetary zollverein similar to what Prussia exacted, would be a solution of the intricate problems of to-day and to-morrow.

Thus far the Smuts ideal is in abeyance. The Chancelleries are impenitent when it comes to conceding "the benefit of the doubt" to each other. Credit facilities are more eagerly sought but they have not been sufficiently broad based to create the requisite optimism. Possibly the conferences initiated by Sir Robert Horne will strengthen sterling exchange, in which event all metals would participate. Gold alone is unassailable, now the cost of producing it is headed toward normal and its purchasing power is advancing. Silver cannot be extricated from necessitous international conditions until "business as usual" has more significance and Washington defines its policy in the matter of the purchase of silver under the Pittman Act. A year ago decreased production and Oriental demand put silver to $1.37 an ounce. Then the seignorage ceased to be adequate, and melting of silver coinage became more profitable, the metal in the dollar being intrinsically worth more than a dollar as bullion. Collectors hoarded silver coin. Considerable European silver coinage was melted and sold. Pressure of this upon the market, and the debacle in the Orient due to over-speculation, started the break which has been almost continuous since last March.

On May 13 silver was at $1 an ounce and the Pittman Act became operative. This Act was passed in 1918 to meet the situation arising from the insistance by India upon payment for war materials in silver, a large amount of which was lying idle in the United States Treasury vaults. By the terms of the Act, 207,000,000 ounces of this silver were to be availed of to settle trade balances in the Orient, the Washington Government receiving an equivalent of $1 an ounce. A further provision was that, as trade became normal, the Government should buy back the same amount of silver, at $1 an ounce, this purchase, however, to be made of silver of American origin. While that action formed a basis upon which producers could work, it also checked any advance about the dollar mark. Producers were stopped from reaping the full benefit of what happened. In February silver went to about 90 pence an ounce in London, and the Shanghai tael exchanged for $1.67. The precipitate fall has militated against Canadian and Mexican mines, but the Pittman Act broke the fall for American silver mines, hence the suggestion that inequities in international exchange might be removed by some sort of agreement bearing upon silver coinage. Bankers have criticized the Pittman Act, but it enabled silver mine owners to operate to a greater extent and "kept a flood of American silver off a demoralized world market," as one authority put it. The Washington Government lost nothing. If the Pittman Act is repealed by the incoming Administration, the Government can replenish its stock of silver at the expense of the producers, whose profits were arbitrarily though temporarily curbed by the upset price of $1 an ounce, as fixed by the Pittman Act. Manifestly it would be unfair to repeal the Pittman Act, and yet "the King can do no wrong." Meanwhile, Canadian producers are prejudiced. They get 60-70 cents plus exchange on New York while the American producers, whose their government take silver, get $1.

During the current year there may be radical departures from standards of credit, designed to bolster up decrepit countries. At any rate the case for silver ought not to be prejudiced. Meanwhile production cannot be pushed. Whatever can be done for the metal without departing from soundest financial principles, should be done, instead of ineffective concerted efforts which put silver mines out of the running.

Copper Producers "Sitting Tight".

According to copper statistics, the past year closed with the available supplies in the States about 30,000,000 lbs. less than they were at the end of 1919. It is assumed that considerable of the Canadian copper production was not marketed. Canada accounted for about 2,000,000 lbs., more than half of it from British Columbia, 30 per cent of it from Ontario, and the remainder scattering. The slump in the market for the metal, especially in the final months prohibited anything like capacity production. Now, those in a position to carry their copper until markets improve, are holding off. While the stocks of raw and refined copper on hand amount to about 900,000,000 lbs., an active demand soon would clean up that. Approximately 200,000,000 lbs. less was produced in the States last year, and yet the visible supplies seemed to be about 30,000,000 less; so the market must have absorbed some of the surplus. At the same time, the situation does not suggest new copper ventures.

Hollinger Consolidated.

Preliminary to the annual meeting, not yet called, anticipating discussion of the Hollinger ore reserves never is welcomed by those in control. Enforced conservatism, high costs and low efficiency on the part of the inadequete working force, have precluded the presentation of much that would have been of greater public interest. The gross revenue last year was nearly $7,000,000, unless there was a slowing down in the concluding weeks. Actual gold production may be placed at about $6,250,000. Having increased the surplus, and being more confident as to the supply of labor, it remains to ascertain whether the ore reserves have been augmented, and, if taxation will be modified. Just what are the ore reserves, in relation to capital liabilities will make this Company the object of favorable comment, when the management is in a more generous mood.

Zinc Institute Seeking More Protection.

Rather than meet the market zinc producers are pursuing a policy of masterly inactivity. They have taken a leaf out of the strike manual and are emulating farmers, copper producers, silver producers, and all others who find it unprofitable to conform to buyers' markets. That the statistical position of zinc is strong, the liquidation of Government stocks and curtailed output made possible. Settlement of the Broken Hill labor dispute is expected to bring Australian zinc into the market. That Canada has become more than ever a factor, has been taken to heart by Americans engaged in this department, and they are conferring at Washington about further tariff protection. President Warren, of the Consolidated Mining & Smelting Company, having petitioned the Canadian Tariff Commission for the protection of zinc and lead, the vote appears to be unanimous. Between the Broken Hill product and the Washington protection proposals, it devolves upon Ottawa to maintain the integrity of the Canadian situation, rather than have it prejudiced unnecessarily. To a certainty, Canada can produce zinc in competition with the other countries, but if trade barriers are interposed then domestic producers will be entitled to assistance. The American Zinc Institute has been assiduous in popularizing the metal, and does not propose to overlook the opportunity to impress Washington. Mexican lead shipped roundabout through England is a grievance. More is at stake with regard to zinc.

MINING IN THE YUKON.

New Mineral Discoveries & Excellent Prospects.

Our issue of the 3rd December 1920 contained a description of the Mayo Silver Area, adjacent to Mayo City, in the Upper Stewart River Country, 150 miles west of Dawson, by Mr. George E. Johnson, who stated that in his opinion the Mayo area "would astonish the world by its richness."

A special edition of the "Dawson Daily News" is to hand, under date of 29th November 1920, gives further particulars of the Mayo area, and in particular of Keno Hill, which it describes as a "massive plateau of silver-bearing rock extending eight miles in length and five miles in width. This hill lies 6,400 ft. above sea-level, is situated 40 miles west of Mayo City, and on it these have been located, it is stated, no fewer than 200 veins, most of them bearing ore or rich silver and lead content.

The most extensive development work to date on Keno Hill is that of the Yukon Gold Company. Ore, averaging, it is said, $200 and more to the ton, is being hauled by horses and sleighs and a motor-truck to Mayo Landing, 40 miles away, and latest advices, (Nov. 15th) state that ten tons of ore are being mined and sent away daily. The ore is silver-galena, and it costs from $100 to $150 per ton to mine the ore and convey it to the smelter at the coast. Some of the ore specimens are of a spectacular kind.

The following review of the mining situation in the Yukon, by George P. Mackenzie, the Gold Commissioner of the Yukon, is taken from the issue of the "Dawson City News" referred to.

"Up to the present Yukon owes her position in the mining world almost wholly to deposits of placer gold, the mining of which has increased the gold supply of the world over two hundred millions of dollars since the first discovery of importance in 1896. With the price of gold fixed, and the mining costs enormously increased by the conditions brought about by the war, it speaks well for the vitality of the industry that it has not entirely succumbed.

Only very rich gravels, however, could be profitably worked during the last five years, and as the richest of the known areas have now been worked, the problem that has been engaging the attention of our mining engineers is, how, under these abnormal conditions working costs may be further reduced so that the very large area of defined low grade gold-bearing gravels can be operated at a profit.

The evolution of the placer mining industry in this country is an interesting study. It is a far cry from the early primitive methods of thawing the frozen gravels by means of wood fires and hoisting with a hand windless to the immense steam thawing plants of today, and the modern gold dredge.

The fact that the auriferous gravels are in the main frozen, necessitating artificial thawing, presents a problem the solving of which has taxed the ingenuity of some of the ablest mining engineers in the world, and it has long been realized that further material reduction in operating costs must be in this item, if at all. During the summer of 1919 both the Yukon Gold Com-

pany and the North West Corporation, Limited, two of the largest operating companies in the territory, experimented extensively with what is known as cold water thawing and demonstrated the practicability of the method, and during the season of 1920 have established beyond question that thawing costs may be reduced at least ten or twelve cents per cubic yard compared with thawing by steam, the cheapest known process up to this time. This is rightly regarded as the most important development in the industry since thawing by steam supplanted thawing by wood fires, and when condition with regard to labor and supplies again become normal, cannot fail in having a stimulating effect on the industry.

The discovery of rich deposits of silver-lead ore on Keno Hill, about forty miles from Mayo, in the Stewart River district, during the summer of 1919, is perhaps the most important made in the territory since the discovery of gold on Bonanza Creek in 1896. Over 800 quartz claims have been located and recorded in the district, and considerable development work done on a number of the claims, the most extensive by the Yukon Gold Company on a group which includes the central or discovery group, which the company has taken over and formed into a subsidiary company known as the Keno Hill, Limited. This company has a considerable force of men employed in mining and hauling to Mayo high grade ore for shipment on the opening of navigation.

Arrangements have been made to mine and haul to Mayo during the present winter at least three thousand tons for shipment to the smelter from that point on the opening of navigation next spring. Other operators will have smaller shipments.

The development work done has shown that this high grade ore is distributed over a large area, but except in a very few cases sufficient work has not yet been performed to speak with assurance of the extent of the deposits. I had occasion to visit the district last summer, and while the time at my disposal only permitted of a visit to a very few of the properties being developed, what I saw and learned from experienced mining engineers and miners on the ground, convinced me that the discovery is one of first importance. The pressing immediate needs of the district are roads and a government assay office and telephone or telegraph communication. Here is certainly a field that should be an attractive one for experienced prospectors who have sufficient funds to keep them in the field at least a year.

The prospects for renewed activity in copper mining in southern Yukon is bright. The Granby Consolidated Mining, Smelting & Power Company, Limited, has had experts in the Whitehorse district during the last summer, and on the strength of their reports, have taken options and are making arrangements to do extensive drilling and other prospecting within the next few months. Lack of capital has always handicapped operations in this field.

In general, a conservative review of the situation warrants the statement that at no time in Yukon's history has the future of the mining industry looked brighter."

Dr. Cockfield, of the Geological Survey has been engaged during the past two years in examination of the new district, and his Report, which it is expected will be issued by the Survey in the Spring, will be looked forward to. In a preliminary note, written at Dawson at the end of September last, and published in the "Dawson News", Dr. Cockfield summarises the geology of the district, and states that while a great deal of prospecting is required before any real estimate of the value of the Mayo area can be made, many of the deposits can even today be worked at a profit. The prospect for a permanent mining camp at Mayo he considers to be fairly bright.

Northern Ontario Letter

THE SILVER MINES.

The Cobalt District.

As was expected, an increase in the demand for commercial bar-silver developed during the opening days of the New Year. As a consequence of this, the quotations for silver increased to a higher point that any time during the last three weeks of December. At the time of writing, with quotations not far under 70 cents an ounce, the outlook for the silver-producing mines of the Cobalt field has improved.

Operators, however, are compelled to take a very serious view of the general situation, and no effort is being made to minimize the difficulties which confront the majority of the mines with costs of operation running perilously near to the total value which the metal commands. Already the closed down mines include the McKinley-Darragh, Temiskaming, Beaver Consolidated and Hudson Bay. In addition to this, the Kerr Lake has closed its production end and is doing only development work, while the Dominion Reduction plant for treating customs ore is closed. These are bare facts which clearly show the difficulties.

On the other hand, such mines as the Nipissing, Mining Corporation, Coniagas and O'Brien, which have occupied the positions of being the four leading producers for some time, are all continuing operation.

The hydro-electric power supply has improved somewhat, partly due to the demand for energy. This appears to leave the question of high operating costs as the only obstacle in the way of maximum production from each of the mines. The cost of supplies has receded only very slowly, and no reduction in wages has been announced. It is obvious, of course, that under present prices for silver, a wage reduction at an early date may be considered inevitable.

The Kerr Lake Mining Company is considering opening negotiations with the Hargraves Consolidated with a view to securing a working option on the two Hargraves claims which adjoin the Kerr Lake. It is learned that by the date of expiry of the option, provided the results achieved warrant the purchase, the Kerr Lake will take over the property at a price which will probably be sufficient to pay off the debts of the Hargraves Consolidated. In event of this, the Hargraves would continue in existence on the strength of other property held. It is learned that these negotiations have been opened as a result of the Kerr Lake having decided to carry on further exploration and development work on its old No. 3 vein, along the lower contact between the diabase and Keewatin formation. This vein runs south onto the Hargraves.

Curtailment of mining and milling operations at the McKinley Darragh mine was due to the present high cost of material and the high wages prevailing making it quite difficult to realize profit, conditions which would have made it necessary to select the richer ore

ore. Such a policy would have placed the physical condition of the mine in jeopardy, and the decision to remain closed for the Winter is based upon the belief that a substantial decline will occur in cost of material and wages.

Suspension of work at the Beaver Consolidated was due in a general way to similar conditions as which caused the McKinley-Darragh to close. It is believed both mines may be able to resume their place among the producers in the early spring. In the meantime, however, more than 300 men have recently been thrown out of employment in this field.

Ore of a fairly high grade is enabling the La Rose Consolidated to continue operations profitably on the University and Princess properties. This company is understood to have closed a favorable period of operation with the end of 1920, the earnings for the twelve months being higher than during either of the two years preceding. It will be some two months before the annual statement is issued.

Next week the Kerr Lake will disburse a dividend of 12½ cents a share, amounting to $75,000, and payable January, 15th. During the following week, the Nipissing will disburse a dividend of 5 p.c. amounting to $300,000, plus a bonus of 5 p.c., making a total of $600,000 from this company, and payable January, 20th.

Elk Lake and Gowganda.

In spite of power shortage the Miller Lake-O'Brien mine will continue operations throughout the entire winter. Power shortage has been felt for some time, although no announcement has been made with regard to the extent of curtailment. It is generally believed this will be confined to the mill, and that underground work will continue normal rate.

A good deal of uncertainty exists in relation to the proposed scheme to build a light railway from Elk Lake to the centre of activity at Gowganda. There has been no definite evidence forthcoming which would assure the district of such an improvement in its transportation problems..

Ore is being hauled to the railway from the Regent Mines at Elk Lake, and part of a car will be shipped to Cobalt for treatment. This trial shipment will have an important bearing on future operations. The shaft is down thirty-five feet, and medium grade ore occurs over a width of about two feet. A meeting of the company is being held in Sarnia this week to determine the question of whether to do its work on straight company account, or to let the underground work by contract. Opinion is divided on the question.

THE GOLD MINES

The Porcupine District.

Announcement comes that the Hollinger will disburse a 1 p.c. dividend on January 28th. This is interpreted in mining circles as an indication that the Hollinger intends to continue on a dividend paying basis of 13 p.c. annually. Since August 11th, last, this company has paid 1 p.c. dividends regularly at intervals of every four weeks. At this rate, the profit distributed amounts to $3,126,000 annually.

At the Dome Mine, an average of from 500 to 600 tons of ore is being treated daily, and it is not expected the company will alter its present rate of dividend disbursements of 2½ p.c. quarterly. Within the next three months the company will be completing plans for bringing the entire plant into play, and increasing daily tonnage to upwards of 1,400 tons daily.

A general appeal is being made in certain parts of the press, with a view to encouraging the companies operating producing mines to issue regular monthly statements as to progress made and the amount produced. It is believed the publication of such statements would encourage greater interest in the mining industry of Northern Ontario and might prove to be of general benefit to the country as a whole. Such a plan, it is believed, would encourage additional prospectors to enter this northern field, and such would undoubtedly be beneficial to all established mining companies. As matters stand, the Lake Shore Gold Mines, at Kirkland Lake, is the only gold mining company to issue regular monthly statements, and this policy has won great popularity for the company, as well as creating a satisfied list of stockholders. In the Cobalt silver area, the Nipissing, and the Kerr Lake are the only two companies to issue regular monthly statements, and these two companies have been general favorites for many years. The public has been presented with much valuable information, and the statements have proved to be excellent propaganda calculated to aid the mining industry and to serve at the same time the best interests of shareholders. It is remarkable to note that the Nipissing has over 13,000 shareholders.

At a depth of 250 feet, the cross-cut on the Porcupine-Keora is stated to have entered a mineralized zone, formerly indicated by diamond drilling. No official statement has been issued, but it is reported in South Porcupine that a number of highly mineralized stringers are in evidence, visible gold showing, but no average assays having so far been made. Considerable further development will be necessary before determining whether or not the development is of commercial importance.

Although some little time has passed since the meeting between officials of the Northerown Mines and the Porcupine V.N.T., no statement has been forthcoming with respect to the progress made in connection with the proposed consolidation of these two properties.

According to official advice to the Journal, good progress is being made in the development of the Ontario-Kirkland Gold Mines. New ore is being developed at the 450-ft level at a point west of the fault reported some months ago. The vein was close to 15 feet in width where cut along the fault, and values range from $4 to $16 to the ton. A conservative average is stated to be from $10 to $12 to the ton as near as has been determined to date. A drift is now being driven along part of the vein, and at intervals of 50 feet short crossents will be driven through the full width of the ore body. It is also officially stated the new 100-ton mill is expected to be completely installed sometime in September and the mine should join the producing list during the last quarter of the current year. The main shaft is down 470 feet, with working levels at 100, 300 and 450 feet. Operations have been under way for over two years, and already more than 3,000 feet of underground work has been done. Ore bodies opened up in some parts of the mine contain gold values ranging from $8 to $28 to the ton, in addi-

tion to the new ore now being opened up west of the fault.

Work has been temporarily suspended on the Fidelity property in the northern part of the township of Teck.

It is learned arrangements are under way with a view to re-opening the Kennedy-Boston property, in the Boston Creek district.

In an official preliminary statement to the president and directors of the Miller Independence Mines, prepared by W. E. Simpson, general manager, obtained by this paper, the following favorable results are shown to have occured during the year 1920:—

"The year just ended has been the busiest in the history of the enterprise, the total amount of development work far exceeding that of all previous years combined.

"The progress of constructive work has been mostly one of bringing to completion operations previously started, chief among which may be mentioned the replacement of steam by electricity with its consequent reduction in working cost and simultaneous rise in working efficiency. The capital outlay for this has amounted to not far short of $50,000 which includes over two miles of transmission-line, motors, sub-station and transformer equipment complete with a capacity of nearly 1,000 horse power. The cost of power consumption has been reduced to about one-third of that previously incurred through the use of imported coal, and the mine has been rendered independent of any foreign fuel supply, the winter heating now being derived from firewood, which is still available locally in comparative abundance. Enquiries are also being received from neighboring properties for the purchase in retail of electrical energy so it must be conceded that the improvement while being essentially a boon to the mine, can also be made the means of greatly benefitting the district. The report further states, in regard to development work:—

"The chief piece of development work on the property was the continued sinking of the "A" or main shaft to a total depth of 515 feet and the opening up of a station and main working area at the 500-ft level. From here a main cross-cut north has been advanced to a point immediately underneath the "D" shaft which, in a straight line is 487 feet north of the starting point. The last hundred feet of this work follows a vein similar in appearance to the hanging wall in the "D" shaft and is being continued to the northern boundary. Cross-cuts both east and west are in progress at this level so as to thoroughly explore the whole of this, (the principal zone of mineralization) in all directions. From here also it will be possible to test all the formations at still greater depth by means of diamond drills.

"At the 500-ft level, a large number of veins have already been intersected each one, without exception showing gold values by assay, but probably the most important discovery was the locating in the main north-crosscut, at slightly less than 200 feet from the shaft, a formation or fracture which examination in detail confirms as being identical in both dip and direction with that encountered right in the heart of the telluride deposit in the "D" shaft. Development work is proceeding energetically on this discovery with most encouraging results."

TORONTO MINING STOCK QUOTATIONS.

Quotations on Active Silver Gold ond Oil Stocks on the Standard Stock Exchange for week ending 8th January, 1921.

Silver.	High.	Low.	Last.
Adanac Silver Mines, Ltd..	2¼	1⅞	2
Bailey	4½	4	4¼
Beaver Consolidated	27	25½	25
Chambers-Ferland	6	6	6
Cobalt Provincial	29	26	26
Coniagas	1.85	1.85	1.85
Crown Reserve	16½	16	16½
Great Northern	1¾	1¾	1¾
Hargraves	3¼	1¼	3¼
La Rose	25	24	24
McKin.-Dar.-Savage	28	23	28
Mining Corp. of Can.	1.00	98	1.00
Nipissing	8.60	8.20	8.60
Ophir	1¾	1¾	1¾
Peterson Lake	9	9	9
Temiskaming	26	26	26
Trethewey	16½	15¼	16
Gold.			
Apex	2½	2	2
Atlas	16	16	16
Dome Extension *	50	38	50
Dome Lake	2½	2¾	2½
Dome Mines	13.00	12.00	13.00
Gold Reef	3	2¾	3
Hollinger Cons.	5.77	5.50	5.77
Hunton Kirkl'd G.M.	9	9	9
Keora	21½	15¼	20
Kirkland Lake	40	40	40
Lake Shore M. Ltd	1.06	1.03	1.06
McIntyre	1.85	1.80	1.83
Newray Mines, Ltd.	5	4½	5
Porcupine Crown	18	16½	18
Porcupine V.N.T.	18	17½	17½
Preston East Dome	2½	2½	2½
Schumacher	18	17½	18
Teck-Hughes	10½	9	10½
Thompson Krist	6½	6¼	6½
West Dome	10	6½	6½
West Tree Mines Ltd.	7	5	7
Oils.			
Petrol Oil, The	32	30	32
Vacuum G.	15½	10	11

MONTREAL METAL QUOTATIONS.

Fair prices of Ingot Metals at Montreal, in less than carload lots:

	Cents per lb. Jan. 12th	Jan. 5th
Copper Electro	19	18¾
Copper Castings	18½	18½
Tin	44	42
Lead	6¾	6½
Zinc	7½	7½
Aluminium	35	35
Antimony	8	7¾

TORONTO COAL PRICES.

Very little coal is moving and dealers report business as extremely dull, partly because of unusually mild weather. Stove and nut anthracite are quoted at $10.50 to $11.50 gross at mines. Smokeless coal is quoted $9.50 to $10.00 at Toronto. Slack $7.50 to $8.25, lump bituminous $8.25 to $8.75.

COAL PRICES.—WINNIPEG.

Winnipeg coal prices are quoted for carload lots f.o.b. at steam plants, delivered at business blocks, dealers at yard, and retail prices, with additional charges for sacking.

Following are prices effective from 28th December, 1921, subject to freight increase or increase in miners' wages.

American Bituminous.	Steam Plants.	Blocks.	Dealers.	Retail.
Lump	15.95	18.10	16.60	.....
Run of pile	14.95	17.10	15.60	.....
Slack	13.95	16.10	14.60	.....
Anthracite.				
Egg and Nut (Stove 50 cents extra	22.00	23.00	21.50	23.00
Pea	16.50	17.50	16.00	17.50
Canadian Bituminous. (Including McGillivary International, Bellevue Hillcrest & Greenhill Coals)				
Lump	12.99	16.00	14.50	16.50
Steam	11.39	14.35	12.85	.....
Mine Run	11.62	14.55	13.05	.....
Slack	11.10	14.05	12.55	.....
Screened	12.54	15.70	14.20	.....
Crows Nest.				
Mine Run (20c. less for steam size)	11.92	14.85	13.35	.....
Canmore.				
Mine Run	11.30	14.25	12.75	.....
Maple Leaf.				
Mine Run	11.30	14.25	12.75	.....
Corbin.				
Lump	12.55	15.50	14.00	16.00
Mine Run	11.30	14.25	12.75	.....
Mountain Park.				
Lump	13.45	16.80	15.30	16.80
Mine Run	11.94	14.55	13.05	.....
Drumheller & Taber.				
Lump	14.60	15.60	14.10	15.60
Stove	12.85	13.85	12.35	13.85
Nut (thru 1½")	9.00	12.00	10.50	12.00
Pea (thru 1")	10.60	11.60	10.10	11.60
Nut Pea	7.00	10.00	8.50	10.00
Lethbridge, Galt and Pembina Coals are quoted at same rates, but only for lump and stove sizes.				
Souris (Lignite).				
Lump	.....	9.00	7.50	9.00

TORONTO METAL QUOTATIONS.

	Jan. 5th, Cents per lb.
Copper, Electro	18
Copper, casting	17¾
Tin	46
Lead	7
Zinc	8
Aluminium	32
Antimony	8

COAL PRICES.

Bituminous coal is dropping in price, and it is likely that consumers will get soft coal next Spring at lower prices than in recent years. This reduction will not be due to decrease of pitmouth prices as much as lessening of intermediate profits. Bituminous coal production has been high and well sustained during the past six months in the United States, and the Winter has been unusually mild so far. Slackness in steel manufacture, and lessening of overseas exports, have lowered the demand, and it is well known that a few tons makes all the difference between a shortage and an apparent over-production. The fact of over-production of bituminous coal in the United States — from legitimate mining concerns — has never been demonstrated. The high profits of recent years have largely gone to ephemeral producers, "farmer's pits and snowbirds", and not to the large companies whose first, last and only business is coal production over the life of their properties. The drop in selling prices will eliminate the temporary producers, and prices will have then to adjust themselves to the cost of production of the regular companies, and this is very close to recent pitmouth sales around $2.75 to $3.25 per ton.

Lower prices to common carriers of bituminous coal will tend to lowering of freight rates, and this also offers some hope to the distant consumer. Fundamental costs of coal production cannot, however, go back to pre war figures, and it may be taken for granted that the last person to receive a wage reduction will be the United States' coal miner. Those districts, however, in Canada and elsewhere that compete with United States coal will have to accept sufficient wage reductions to offset the differential in favor of the United States which originates in the more favorable physical conditions under which coal is mined there.

There is by no means the same tendency to dropping prices in anthracite, and in this case, the question of over-production cannot be mooted, it being hardly possible to conceive such a condition in view of declining anthracite reserves and increasing population desiring to use anthracite because of its undoubted advantages as a fuel. So far as anthracite consumers in Canada are concerned, they may look for lowered prices arising from improvement of the Canadian exchange on New York, and lowering of freight rates when commodities get down a little lower in price and wages follow, but there is virtually no likelihood that the pitmouth prices of anthracite will recede materially from present quotations. Indeed they may increase.

The embargo on the freight offered to the Canadian National Railway by the Dominion and Scotia Steel Companies imposed by the railway brotherhoods employed on the Canadian National Railways has been stated by a leading official of the railway unions to have been ineffective and mistaken and to have played into the Company's hands. There is little advantage, apart from other considerations, [illegible] embargoing the products of plants that are not producing and Mr. Stone's sizing up of the situation is quite accurate.

G. Gray, formerly on the staff of the Dome Mines Company takes charges of operations on the Amalgamated Goldfields property at Larder Lake, succeeding [illegible] month.

British Columbia Letter

Semi-official estimates of the mineral production of British Columbia for the year 1920, based on reliable figures furnish a surprise to most comutators. The unexpected results of the year's work are to be found in connection with the output of silver and copper. Silver, it appears likely, will show a slight increase over 1919, the improvement amounting to about eighteen hundred ounces. The explanation, of course, lies in the activities of the northern mines, chiefly the Dolly Varden at Alice Arm although it was not thought possible that the blight with which the Slocan Silver Mining Camps were afflicted through labor troubles would be overcome. There were approximately three hundred thousands pounds more copper produced in the province than in the previous year. Lead will show a decline of nearly eight million pounds but zinc is put down for an advance of over twenty million pounds. All things considered, therefore, the past year has very creditable to the mining industry of British Columbia.

However the condition of the mining industry in British Columbia at the close of 1920 may have appeared to those pessimistically inclined there is no doubt, because it is indisputably proven by figures, that the Canadian Consolidated Mining Smelting & Power Co., whose smelter headquarters are at Trail, has had a banner year.

The mines and the smelter of this company has produced mineral aggregating a value only less in comparison with previous years to what was accomplished in the war years of 1917 and 1919. The estimated value of its 1920 output is $8,161,200 as against $7,942,191 for 1919. If the comparison were based on the quantity of the metal turned out the achievement of the twelvemonth just passed would appear in an even more favorable light.

A decline is shown in the production of the precious metals and copper. This is accounted for by the closing down of the Rossland Mines and to some extent by the failure of the Canada Copper Company to continue shipment of copper concentrates to the Trail Smelter. Perhaps a better explanation can be found in the reduction of the output of the Slocan Mines by reason of the fact that there was a dearth of labor for so many months.

These decreases, however, have been more than compensated for by the production of the Sullivan Mine in lead and zinc, chiefly in respect of the latter which contributed more than one-third of the total value of the smelter's output.

The total ore receipts at the Trail Smelter for 1920 approximated 381,275 tons, a gain of 60,797 tons over 1919. The production of the mines of the Kootenay-Boundary Districts, however, did not equal the 1919 figure as in that year over 556,000 tons of Granby Ore were handled by the Granby Company's Smelter at Grand Forks, since closed down.

Receipts at the Trail Smelter up to May 21 showed that the Sullivan Mine at Kimberley up to that date produced 59,582 tons of zinc ore and 2,955 tons of lead ore. After that date the Company lumped the receipts from all its properties and the origin of the company ore, as to districts, is not distinguishable. There is no reason to believe, however, that the East Kootenay Mine failed to maintain the pace set at the beginning of the year.

Improved processes of treatment are credited with responsibility for the showing made by the Canadian Consolidated Mining Co. in 1920. One of the developments of 1919 was the erection of a large experimental mill at Trail to treat the Sullivan ore and this plant designed for 600 tons was one year ago handling 400 tons daily. Now, owing to various improvements, it is handling from 800 to 900 tons. At the beginning of 1920 magnetic separation was giving excellent results. In March an improvement in the flotation process deleted the magnetic machines from the flow sheet. An important modification in June gave even better results. Twice during October further improvements were introduced. These various improvements either increased recoveries or brought about economies which contribute to the reduction of the cost per pound of producing the metal.

Three years ago the Consolidated Company, as the result of years of experimenting, was able to produce refined zinc for the high market then existing. The market since 1918 has steadily declined, till now i is slighly below pre-war level, but constant improvement to the process of treatment, aided somewhat by more economical mining, have enabled the company to still produce zinc profitably. Two years ago this accomplishment would have been beyond belief.

Further development of the Company's zinc industry as to time will probably depend on the money market. A site has been acquired at Kimberley for the projected large mill and one of the possibilities is that one unit of this mill, a unit of 2,500 tons capacity, could be proceeded with without entailing too heavy a draft of the money market. At present the Sullivan is stoping at the rate of about 800 tons of lead-zinc ore a day and the mill could be operated up to 1,000 tons capacity without necessitating further power development at the West Kootenay Power & Light Co's. plant at Bonnington Falls. Incidentally the factor that has reduced mining costs at the Sullivan is that selective mining has ceased and the ore being treated is run-of-mine.

It is said that the power company, now a subsidiary of the Consolidated, in order to furnish current to operate a unit of 2,500 tons at Kimberley would have to double its existing plant at Upper Bonnington, and that when the mill is extended to 5,000 tons recourse will have to be made to further development of the lower falls.

The operation of a 2,500 ton mill at Kimberley would require double parts of the present zinc plant at Trail.

A production of 5,000 tons a day at the Sullivan is said to be well within the mark of economic mining and this would equal 40 per cent of the world's zinc output.

With reference to the proposed construction of a concentrator for the treatment of the ores of the ores of the Rossland Camp it is said that it is now assured that the site of the plant will be at or near Trail and that the million-dollar installation when complete will have a capacity of from 1,500 to 2,000 tons.

Among the Company's 1920 developments are the enlargement of its copper refinery from a 30-ton to two 50-ton capacity and the commencement of the erection of a mill for the manufacture of copper rods. This structure and plant is nearly ready and

The Canadian Miners' Buying Directory.

Acetylene Gas:
Canada Carbide Company, Ltd.
Canadian Fairbanks-Morse.
Prest-O-Lite Co. of Canada, Ltd.

A.C. Units:
MacGovern & Co.

Agitators:
The Dorr Co.

Air Hoists:
Canadian Ingersoll-Rand Co., Ltd
Mussens, Limited.

Alloy and Carbon Tool Steel:
H. A. Drury Co., Ltd.
International High Speed Steel Co., Rockaway, N.
Peacock Brothers Limited.

Alternators:
MacGovern & Co.

Spielman Agencies, Regd

Aluminium:

Amalgamators:
Northern Canada Supply Co.
Mine and Smelter Supply Co.
Wabi Iron Works.

Antimony:
Canada Metal Co.

Antimonial Lead:
Pennsylvania Smelting Co

Arrester, Locomotive Spark:
Hendrick Manufacturing Co.

Arsenic White Lead:
Conlagas Reduction Co.

Assayers' and Chemists' Supplies:
Dominion Engineering & Inspection Co
Lymans, Limited
Mine & Smelter Supply Co.
Pennsylvania Smelting Co.
Stanley, W. F. & Co., Ltd

Ash Conveyors:
Canadian Link-Belt Company

Ashes Handling Machinery:
Canadian Mead-Morrison Co., Limited
Canadian Link-Belt Co., Ltd.

Assayers and Chemists:
Milton L. Hersey Co., Ltd
Campbell & Deyell
Ledoux & Co.
Thos. Heys & Son
C. L. Constant Co

Asbestos:
Everitt & Co.

Balls:
Canadian Foundries and Forgings, Ltd
Canadian Steel Foundries, Ltd.
Hull Iron & Steel Foundries, Ltd.
Fraser & Chalmers of Canada, Ltd
Peacock Brothers Limited.
The Electric Steel & Metals Co
The Wabi Iron Works.
The Hardinge Conical Mill Co

Ball Mills:
Hardinge Conical Mill Co.
Hull Iron & Steel Foundries, Ltd.
Mine and Smelter Supply Co.
Fraser & Chalmers of Canada, Ltd
The Electric Steel & Metals Co.
The Wabi Iron Works.

Balances—Heuseer:
Canadian Fairbanks-Morse Co., Ltd.
Mine and Smelter Supply Co

Babbit Metals:
Canada Metal Co.
Canadian Fairbanks-Morse Co., Ltd
Hoyt Metal Co.

Ball Mill Feeders:
Fraser & Chalmers of Canada, Ltd
Hardinge Conical Mill Co.
Hull Iron & Steel Foundries, Ltd

Ball Mill Linings:
Hardinge Conical Mill Co.
Hull Iron & Steel Foundries, Ltd

Belting—Leather, Rubber and Cotton:
Canadian Fairbanks-Morse Co., Ltd
Canadian Link-Belt Co., Ltd.
The Mine & Smelter Supply Co
Northern Canada Supply Co.
Jones & Glasco.

Belting:
R. T. Gilman & Co
Gutta Percha & Rubber, Ltd

Belting—Silent Chain:
Canadian Link-Belt Co., Ltd
Hans Renold of Canada, Limited, Montreal, Que
Jones & Glasco (Regd)

Belting (Transmission):
Goodyear Tire & Rubber Co

Belting (Elevator):
Goodyear Tire & Rubber Co.

Belting (Conveyor):
Goodyear Tire & Rubber Co.
Gutta Percha & Rubber, Ltd.

Blasting Batteries and Supplies:
Canadian Ingersoll-Rand Co., Ltd
Mussens, Ltd.
Northern Canada Supply Co.
Canadian Explosives, Ltd.
Giant Powder Co. of Canada, Ltd.

Bluestone:
The Consolidated Mining & Smelting Co.

Blowers:
Canadian Fairbanks-Morse Co., Ltd
MacGovern & Co., Inc.
Northern Canada Supply Co.
Fraser & Chalmers of Canada, Ltd.

Boilers:
Northern Canada Supply Co.
Canadian Ingersoll-Rand Co., Ltd
Marsh Engineering Works
MacGovern & Co., Inc.
R. T. Gilman & Co.
Fraser & Chalmers of Canada, Ltd.
The John Inglis Company
Wabi Iron Works.

Blue Vitriol (Conlagas Red):
Canadian Fairbanks-Morse Co., Ltd

Bortz and Carbons:
Diamond Drill Carbon Co.

Boxes, Cable Junction:
Standard Underground Cable Co. of Canada, Ltd.
Northern Electric Co., Ltd.

Brazilian Rough Diamonds:
Diamond Drill Carbon Co.

Brazilian Mica:
Diamond Drill Carbon Co.

Buggies, Mine Car (Steel)
Hendrick Manufacturing Co

Brazilian Ballas:
Diamond Drill Carbon Co.

Brazilian Rock Crystal:
Diamond Drill Carbon Co.

Brazilian Tourmalines:
Diamond Drill Carbon Co.

Brazilian Aquamarines:
Diamond Drill Carbon Co.

Bridges—Man Trolley and Rope Operated—Material Handling:
Canadian Mead-Morrison Co., Limited

Bronze, Manganese, Perforated and Plain:
Hendrick Manufacturing Co.

Buckets:
Canadian Ingersoll-Rand Co., Ltd
Canadian Mead-Morrison Co., Limited
The Electric Steel & Metals Co
R. T. Gilman & Co.
Hendrick Manufacturing Co.
Canadian Link-Belt Co., Ltd
Marsh Engineering Works
Mussens, Ltd.
MacKinnon Steel Co., Ltd.
Northern Canada Supply Co.
Fraser & Chalmers of Canada, Ltd
The Wabi Iron Works

Buckets, Elevator:
Canadian Link-Belt Co., Ltd.
Hendrick Mfg. Co
Peacock Brothers Limited.

Cable—Aerial and Underground:
Canada Wire & Cable Co.
Northern Canada Supply Co
Standard Underground Cable Co. of Canada, Ltd

Cableways:
Canadian Mead-Morrison Co., Limited
Fraser & Chalmers of Canada, Ltd
Mussens, Ltd
The Wabi Iron Works
R. T. Gilman & Co.

Cages:
Canadian Ingersoll-Rand Co., Ltd., Montreal, Que
Northern Canada Supply Co.
Fraser & Chalmers of Canada, Ltd.
The Electric Steel & Metals Co
The Mine & Smelter Supply Co.
Mussens, Ltd
The Wabi Iron Works

will roll 50 tons of rods in a eight hour shift. The re-building of the silver refinery, one of the best on the continent, has been completed and a concrete pumping plant, drawing water from the Columbia river, has been constructed in such fashion as to be unaffected by the rise and fall of the water.

Squamash, B. C.

Preparations are being made by the Tatlayoco Lake Gold Mines, Ltd., to install a concentrating plant of 100 tons capacity. The property consists of six crown-granted mineral claims situated off the line of the Pacific Great Eastern Railway on which $50,000 worth of development work has been done. Four tunnels have been driven and ore has been disclosed containing good values in gold, antimony, and arsenic. There are a saw mill and an assay office on the ground.

Vancouver, B. C.

The manager of the Hedley Gold Mines, Ltd., stated recently in addressing the mining bureau of the Vancouver Board of Trade that if economic conditions permit the Nickel Plate Mine will be re-opened within three months. It is asserted that, providing a satisfactory declaration of policy as to taxation can be secured from the government, there was reason to believe that conditions soon might be expected to be so improved as to permit the mine to be operated.

The Northwest Mining Convention, which is to be held at Spokane, Wn., next month, will be largely attended by representatives of the mining industry in British Columbia. Hon. Wm. Sloan, Minister of Mines, is likely to be present. Mr. Nichol Thompson has been appointed to attend on behalf of the mining bureau of the Vancouver Board of Trade.

There is to be a convention of the British Columbia Branch of the Canadian Institute of Metallurgy and Mining between the eighth and the eleventh of next month at Vancouver when the programme of the institute's year's activities will be drafted and business of importance to the industry discussed.

In discussing the geology of the Salmon River District, Portland Canal, B.C., before the Canadian Institute of Metallurgy and Mining, Dr. Schofield, of the University of B. C. and formerly of the Canadian Geological Survey, stated recently that the most important rocks were the quartz porphyries and the tuffs and observed that most ore bodies occurred at the contact. The only instances of secondary enrichment in the district were the discovery of native silver along fault line in ore bodies but these deposits did not go to any depth. The ordinary silver ore bodies, however, were likely to be found to continue at depth, so that some of the properties under development might be expected to prove valuable mines.

During the year 1920 there were 1348 deposits at the Dominion Assay Office, Vancouver, the aggregate value of which was $2,499,230. In 1919 the deposits totalled 1391 and the value was $3,547,525. In 1918 there were 1,358 deposits and the value was $4,099,596. The bulk of the gold production of British Columbia and the Yukon passes through the Vancouver Office so that these statistics tell the story of the effect of the fixed value of gold and the rising costs of production. The fact that gold is bought in American Funds only partially off-sets the high cost of operation.

Stewart, B. C.

It is reported to be a possibility that an 11-mile aerial tramway will be constructed from the Premier Mine, Salmon River, to tidewater to take care of the transportation problem facing the management of the Premier Gold Mining Co. To keep the road open is said to be proving too costly and constant a task. The drop between No. 2 tunnel where shipments originate and Stewart is about 1,400 feet, of which 900 feet occurs in the first three miles. H. A. Gness, managing director of mining operations, is understood to have commissioned competent engineers to investigate and report on the project. There now are several hundred tons of high grade ore at the mine awaiting shipment.

Prince Rupert, B. C.

G. A. Clothier, provincial government mining engineer, has asked the co-operation of the administration of Alaska in the building of a wagon road up the Unuk river into the mineral zone lying to the north of the British Columbia Portland Canal Mining District, which includes both American and Canadian territory. Mr. Clothier has explained to Governor Thomas Riggs that the road suggested would run up the Unuk River for a distance somewhat greater than 25 miles and into a section of which little is known except that its geological formation is such as to lead to the conviction that it has mineral possibilities. Governor Riggs is expected to submit the matter to the Territorial Road Bureau.

Alice Arm, B. C.

The Dolly Varden Mine has closed down temporarily. With the close of the railroad, because of a heavy snowfall some weeks ago, shipments from the property ceased.

EDITORIAL

THE FAITH OF A GEOLOGIST.

Dr. John C. Merriam took for the subject of his presidential address before the Geological Society of America the background of history as seen by the student of those sciences that deal with the physical history of Earth, the background "out of which history "emerges and against which its movement must always "be projected". Dr. Merriam dealt with a viewpoint of the geologist of wider range, permitting of more extended vision, that that of the student of recorded human history, and one which has before now brought him into conflict with the theologian. "Of all favored men", says Dr. Merriam, "the geologist and paleonto- "logist see the panorama of the past unrolled in clearest "reality. To them the life record is not written in "doubtful hieroglyphs and symbols. It represents the "imprints of living feet that have never ceased to "advance in unbroken procession over a trail that "winds upwards through the ages".

At a time like the present, when many are suffering from spiritual disillusion, and whole nations have apparently slipped backwards and have lost hope in the future, it is helpful to have the testimony of a geologist "as the ages go by, in each successive step, almost "without exception, we find a higher level of life, rep- "resenting greater intelligence, greater efficiency, and "greater progress".

Dr. Merriam sees no reason to apprehend cessation of being or of a continuity in the forces that have hitherto made world history, and he foresees a time when man shall reach "to heights of mental ability, of comprehension, of intellect, of understanding, greater than those yet known".

The record of earth sciences Dr. Merriam summarises as "tangible proofs of progress from eon to eon which "might well help a forlorn world to take heart once "more. We may not understand the method by which "betterment has come, but we see the stages of its "movement and realize that, whatever struggles the "future may have in store, we shall always be credited "with a margin of safety when we risk ourselves in "the cause which makes for uplift in the truest sense."

Brave words these and refreshing. Man has never gone wrong through excess of knowledge, but through insufficiency, and those timid souls who in earlier and well-nigh forgotten days feared for the eternal verities because the paleontological record apparently contradicted their preconceptions, stand rebuked by the strengthening of faith and the buttressing of hope that always follows earnest and honest research and the acceptance by man of the logical conclusions of his own intellect based on the accumulated record of the sciences.

The half-learned man may pose as a cynic and become self-sufficient, but the wider vision of the past that accompanies great learning brings with it completer understanding of what is yet to be, and tends to tolerance, faith in humanity's future, and the humility of wisdom.

SIR J. H. DUNN, Bt.

A sufficiently significant commentary on the criticisms of a parliamentary Select Committee upon the British Government's interest in the British-America Nickel Corporation is the baronetcy conferred upon James Hamet Dunn in the New Year Honours "for public services rendered to the Government during the war." It is understood that these services consisted in making the precise arrangement that the Select Committee disapproves of "on purely commercial grounds."

THE MAYO SILVER DISTRICT.

By the courtesy of the Director of the Geological Survey we are enabled in this issue to include a description of the Mayo Silver Area, and of the development work to date, by Dr. W. E. Cockfield, who has for two years been engaged in examination of the district. The establishment of a silver lode mining camp in the Yukon, and was made the subject of a special edition of the "Dawson Daily News" that was not only a credit to journalistic enterprise and the belief of the Yukoners in their country, but contained information regarding the agricultural achievements and the communal conditions of Dawson and its vicinity that are quite at variance with usually accepted ideas of this northern outpost of Canada.

The Dawson "Daily News" states that the Yukon has already given two hundred million dollars of gold from its placer camps, and it looks forward to a further contribution of similar amount from the Mayo area alone. We hope this prediction will be realised.

By no means the least interesting item in the special edition of the "News" referred to is the menu of a Dawson cafe, in which every item of the bill-of-fare is stated to be the product of some Yukon farm, forest or stream. The menu is of proportions that indicate good appetities in Dawson, and the prices are much more moderate than the average Canadian hotel in the East.

ELECTRIC LOCOMOTIVE IN COAL MINING.

Some months ago, "Coal Age" stated that if the electrically-operated locomotive had to be done without in United States collieries it would become necessary to abandon many of these mines. There is no doubt that the refusal of British authorities to permit the use of this type of haulage motor underground in coal mines has prevented much economy in mining costs. It may also have prevented much loss of life and wastage of property that would have outweighed the initial saving in production cost. The same statements are applicable to coal mines in Canada, more particularly to collieries in Nova Scotia and British Columbia.

While we would hesitate, even at any prospect of cost saving, to recommend the adoption of such risky equipment as is common in many coal mines in the United States, the possibility of employing a type of electric haulage motor that is reasonably safe is worthy of consideration in some Canadian collieries that have up to now barred the electric locomotive because of its dangers. The question of haulage costs is one of ever-increasing importance, and in some mines it is greater than the cost of mining the coal.

The greatest economy resulting from the use of electric locomotives in collieries in the United States has been in their substitution for men and horses as "gathering motors" in the face-roads feeding the auxiliary and main haulages. This practice, of course, involves the employment of electricity at or near the face of the coal, the position of greatest danger from explosive conditions of the mine air.

The storage-battery locomotive is preferable from a point of safety to a trolley-operated motor, and a number of motors of this type have already been used in coal mines in Canada, and are also used in metal mines where explosive conditions are absent.

The handicap of cost imposed upon some Canadian coal mines by physical conditions and extreme length of haulages underground is now so severe that unless cheaper operating costs can be obtained by the use of mechanical equipment in substitution for hand labor and by speeding-up the movement of the coal from the face to the pitmouth, the production of these mines will be limited to the supplying of immediate local needs, as the costs of mining will be too high to permit of additional costs of transportation to a market.

In considering ways and means to cheapen coal production it is suggested that the use of electric motors underground should be given serious consideration. There are varying degrees of danger in the underground conditions of coal mines, even in the same district, and that fact that the use of electric motors is properly considered inadvisable in some collieries, should not deter impartial enquiry into the possibility of using them in mines having less dangerous atmospheric conditions.

At the same time it is necessary to protest against the widely disseminated idea that the coal mine equipment of Canadian and British collieries is out-of-date. A usually fair and discriminating editorial writer in "Toronto Saturday Night" blamed the low individual output of the British miner on the use of obsolete equipment. The precise truth is that nowhere is the theory and practice of coal mining more advanced than it is in Britain, but nowhere do the statutory regulations imposed to secure safety of human life act so stringently in restriction of output and enhancement of the cost of coal production. The larger individual output of the United States miner is in large measure due to thicker and more accessible coal seams, and to the use of mechanical appliances that the Coal Mines Regulation Act of Great Britain and the similar act of the British Dominions specifically prohibit because of their risk to life.

ENGINEERING STATUS LEGISLATION DISCUSSED BY TORONTO BRANCH C. I. M. & M.

The Toronto branch of the Canadian Institute, at a meeting at the Engineers' Club in Toronto on Jan 15th discussed the proposed legislation in respect to the engineering profession to come before the Ontario Legislature at its coming session. The draft act is already in shape, having been finally formulated by the Advisory Conference Committee on Engineering Legislation. This committee was organized to consider the question of engineering legislation for the Province of Ontario and at the time of its formation it was understood that the function of the committee was advisory only, and that it should report back to the constituent bodies. The feeling of the mining engineers at the meeting was favorable to legislation which would elevate and increase the status of the engineer and protect the public and it was thought by some that the legislation should follow the general lines of the Solicitor's Act, making proper examination mandatory and not restricted to any country in its scope. A general discussion of the matter was participated in by Mr. D. O. Lewis, of Victoria, who is connected with the Canadian National Railways and Mr Dunn of Winnipeg, who briefly outlined the status of the engineering profession in their respective provinces. The main features of the bill are as follows:

1. It follows closely along the lines of legislation already enacted in the Provinces of British Columbia,

Alberta, Manitoba, Quebec, New Brunswick and Nova Scotia. For this reason reciprocal privileges between these provinces and our own should be much easier than if our legislation were on radically different lines.

2. It places the control of engineering in the hands of the profession itself, thereby avoiding control by Government officials who may lack full understanding of our diversified needs.

3. The Government will have a share in choosing the personnel of the Council, thus providing a guarantee that the Council cannot be controlled by any particular group.

4. The different branches of engineering are given equal representation, so that no one branch can gain control.

5. The branches are made partially autonomous, so that their regulations may vary from one another in matters requiring such variation. At the same time the Council has power to prevent these variations becoming too extreme.

6. The legislation is intended to cover engineering only. Technical trades and similar occupation cannot be brought within its scope. It is only by remaining distinct from these that engineering can attain full professional status.

7. Provisions for registration of present practicing engineers are made reasonably broad so that nobody with fair pretentions will be debarred from his present livelihood.

The Committee feels that these features should prove acceptable to every professional engineer in Ontario. Other styles of legislation may have points in their favor, but the above considerations were considered to be of more importance.

The Committee hopes that every engineer will consider the draft bill from the standpoint of broad, general principles, and lend his hearty support to it, if found satisfactory in this regard. It will never be possible to get every minor detail adjusted to the full satisfaction of all concerned. To give consideration and effect to all the petty amendments and alterations which might be proposed, would effectively prevent the matter ever being brought to an issue.

TARIFFS AND "CART-TAIL ORATORY."

"We are apt to speak casually of the tariff of the United States, without stopping to think that a tariff policy is the one thing we never have had. Since the first discussion in 1789, we have been deluged with argument on both sides of the question, for whenever a political party is utterly at a loss for a platform, it immediately takes up the question of changing the tariff, in one direction or the other. Congressional and cart-tail oratory have never been lacking, while the books, pamphlets, reports and briefs on tariff questions have been one of the main causes for the vast growth in the American paper industry."

Edwin C. Eckel, "Coal, Iron & War."

Between the Railway Commissioners and the Railway Brotherhoods, the word embargo is coming to have an unpleasant significance in Cape Breton Island. The embargo on coal in the Summer injured the coal trade, and the railwaymen are now doing their best to injure the steel trade, which everybody knows has sufficient troubles of its own without the opposition of those who live upon it.

CORRESPONDENCE.

A GRIEVANCE.

Editor Canadian Mining Journal.

Sir:

Permit me to draw to your attention a matter of grave moment.

The conjoint committee of engineering societies has recently drafted a bill for the consolidation and protection of the engineering profession. My branch of the profession has been totally and, I fear, deliberately, overlooked.

I am a theologist. My claims for the inclusion of my profession in one of the engineering categories are at least as valid as are those of the geologist.

To be both brief and specific, let me enumerate a few points that are incontrovertibly axiomatic.

1. The geologist studies genesis. The theologist specialises in exodus.

2. Both professions are levitical.

3. An understanding of the phenomena of metamorphism (in the one case that of mere rocks, in the other that of souls) is fundamental to both geologist and theologist.

4. In the matter of results ours is infinitely the more practical vocation.

Whilst the engineering phase of the geologist's activity is confined to the political arena, our engineering practice covers the social, moral, business, commercial, and political fields, not to mention our functions in relation to the hereafter.

Sir, exclusion of the theologist from the fold is as invidious as it is cruel. I do not wish to impute motives, but I am to confess my belief that our professional brethren, the geologists, will not be held guiltless if we continue to be denied admission.

Were it seemly I would cite scriptural warrant for this warning. Let it be taken to heart.

Yours in thermal fervor,

REV. H. E. AVENS.

THE WESTREE-SWATSTIKA RAILWAY PROJECT

Editor,

Canadian Mining Journal.

Sir:—

Your correspondent from Montreal, in your Journal for the 7th, appears to lack information when dealing with the proposed Railway from Westree to Swatstika.

Gowganda alone, have produced in round numbers, 6,000,000 ounces of silver. That more of that sort of Script is not available, the lack of railway transportation facilities are chiefly responsible.

The building of this Railway is not asked as a matter of charity but as a matter of justice to invested capital.

During the year ending Oct. 31, 1920, the T. and N. O. made a profit of $3,000,000 chiefly from the mining industry. Additional revenue collected from mining during the year, by the Government, amounted to over $1,000,000. The Editor of the "Northern Miner" voices the general feeling of the North when he says "Put it back".

I do not think that the people of Northern Ontario would ever wish to guide public expenditure asked for by the people of Quebec and fail to see why our Montreal correspondent is using the little hammer.

L. O. HEDLUND.

The Silver Lead Ores of Mayo District, Yukon

(W. E. COCKFIELD).
(Published by permission of the Director, Geological Survey, Ottawa).

Mayo district has been attracting more and more attention from a mining standpoint within the past few years, as it is the only district in central Yukon that promises to develop into a lode-mining centre in the immediate future. In the year 1914, with the opening of the extremely rich deposit at Galena creek, an impetus was given to the seach for argentiferous galena, which resulted in the discovery of a number of promising properties. These include Keno hill, Lookout mountain, Rambler hill, Stand-to mountain, Mt. Cameron, and a number of others.

Keno Hill.

Keno ridge is a long wedge-shaped ridge lying between the heads of Lightning creek, Christal creek and Ladue river about about 42 miles from Mayo by road. It has the characteristic flat top of the Yukon plateau country, and is surmounted by a number of hillocks known locally as Keno hill, Minto hill, Monument hill, Caribou hill and Beauvette hill. Upwards of 600 claims have been staked on the ridge, and on most of these sufficient work has been done to keep them in good standing. Real development work, however, has been performed only on a small number of groups.

The geology of Keno hill is similar to that of the greater part of Mayo area. The rocks exposed consist of a series of crystalline schists and gneisses, intruded by sills of greenstone and dykes and sills of rhyolite, quartz porphyry and granite porphyry. The schist series is made up of gneissoid quartzite, quartz-mica schists, mica, and chlorite schists. The greenstone sills vary in colour, composition and texture, ranging from a diorite to a diabase. The acid sills and dykes are believed to be apophyses from a granite mass to the eastward. The strata in general have an east-west trend and dip to the south at low angles. Near the hillocks known as Keno hill, Minto hill and Monument hill, however, they undergo a sharp flexure bending nearly at right angles, and in the vicinity of this flexure there is much local faulting.

The ore bodies are found in fissure veins and are consequently intimately related to the systems of faulting. Two such systems have been recognized, one of which is in a general way parallel to the trend of the strata and will be referred to as longitudinal faulting; the other making an angle of 70 to 80 degrees with these and crosscutting the strata, will be referred to as transverse faulting. In the longitudinal system one main fault traverses the ridge for several miles and in the vicinity of the flexure referred to above diverges into three main branches, which are also quite persistent. Traces of other faults parallel to these have been found, but owing to the rather heavy drift cover, they could not be followed any considerable distance. These faults are mineralized with quartz and arsenopyrite, and occasionally with galena, manganite and siderite. The transverse faults occur in great numbers, particularly in the vicinity of the flexure referred to above. As a rule they are much shorter than the longitudinal faults and of relatively slight displacement. They are mineralized with galena, manganite and siderite, and occasionallly with calcite and zinc blende. In both systems the galena is enriched in places with freibergite.

Ore Shoots.

The principal ore shoots already discovered lie in the transverse faults. From what has already been learned it may be established as a general rule that where one of these fissures taps a longitudinal fault and passes upward out of a hard stratum such as quartzite or greenstone into schist, on ore shoot will be found in the vein below the schist capping. In the longitudinal faults ore deposition has taken place at points where the older filling of quartz-arsenopyrite has been opened by a distinct fracture, but at some localities a disseminated ore does occur, which may have been introduced at the time of formation of these veins.

The ore shoots vary in width from a few inches up to 4 or 5 feet. The galena in them is fairly free from mixture with gangue minerals and samples are usually taken of the galena only. A content of about 200 ounces of silver per ton and 60 per cent lead probably represents closely the value of the ore shoots. None of these shoots has been fully blocked out as yet, and none of the deposits has been tested in depth. The galena occurs fresh and unaltered right at the surface, but on some properties carbonates are encountered at a depth of a few feet. In other cases no alteration was noted.

It is expected that about 3,000 tons of ore will be hauled to Sewart river during the winter from these deposits.

Lookout Mountain.

The Lookout property is situated on a spur of Lookout mountain about 29 miles from Mayo by road. It is being prospected by a number of local men and the development includes about 1,000 feet of underground work. There are three adits, the uppermost of which is 50 feet long and is terminated by a winze 25 feet deep. A second adit 39 feet below the upper and 90 feet to the north is 59 feet long to the point where it taps the vein, which is followed by a drift to a point directly below the winze. The third adit is 125 feet below and 320 north of, the second, and is 135 feet long. It is terminated by a drift on the vein 305 feet long. From this drift an incline and winze have been sunk.

The vein follows a well-defined fracture 7 to 12 feet wide, in quartzite and quartz-mica schist. The filling consists of quartz, manganite and pyrolusite, limonite, cerussite and anglesite and galena. The ore is of a disseminated character, the galena occurring in small streaks and masses, which are in some cases sufficiently concentrated into zones to be termed ore shoots. Three such zones have been cut by the workings but none of them have been fully blocked out. The ore is of a lower grade than the Keno deposits and will require milling before shipment. Several small shipments of hand-sorted ore have been made from this property. (1)

Rambler Hill Property.

Rambler hill is situated near the foot of McQuesten lake about 50 miles from Mayo. A winter road passes near the property.

(1) For more complete descriptions, see Geol. Surv., Can., Sum. Rept., 1918, 1919, pt. B.

At the time of the writer's visit very little could be seen of the deposits owing to the shaft being partly filled with ice. The width of the vein is 12 feet but this included several horses of country rock. The filling consists of limonite, galena, pyrite, quartz, cerussite, anglesite, malachite and chalcopyrite. The limonite makes up the bulk of the deposit, but in it are nodules of galena, apparently residuals, coated with oxidation products. The deposit at Rambler hill, showed an iron capping of considerable extent through which the workings had not penetrated in 1918. Since the writer's visit, it is claimed that much better showings were encountered lower on the hillside and these are being drifted on.

Mount Cameron.

Mt. Cameron is situated about 65 miles from Mayo by road and is more interesting as serving to show the extent of these deposits than from an economic standpoint. It is not considered that the deposits here can be worked until better facilities for transportation can be afforded. It is hoped with the opening of the Keno hill deposits that means of communication in the district will be improved.

Only the outcrop of this deposit could be seen. This is apparently a shear zone with a width of about 50 feet, mineralized with galena, sphalerite, limonite, siderite, malachite, azurite, chalcopyrite, pyrite and calcite. The vein has a banded appearance with alternating streaks of galena, sphalerite and other gangue minerals.

Other Occurrences.

The deposits on Stand-to mountain, and several newly-discovered deposits lying between Rambler hill and Mt. Cameron have not yet been visited by the writer. The stand-to property is situated across Ladue valley from Keno hill, and evidently marks the extension of the Keno deposits.

Conclusions.

It is only a few years since the first shipment of ore was made from Galena creek, and in that time all the deposits mentioned in this article have been discovered. These are widely scattered and embrace an area of at least 1,000 square miles. As the country is a difficult one to prospect it is extremely likely that prospecting will bring to light other similar deposits, but it remains to open one or more mines in order that transportation facilities may be improved. With such improvement lower grade properties may be worked, and as the Keno hill properties are in a fair way towards establishment as producing mines, the prospects of Mayo district becoming a lode mining camp are regarded as favourable.

NOVA SCOTIA COAL MINING.

Practical cessation of all pig iron and ingot steel manufacture at the steel plants in Cape Breton Island, and curtailment of export orders, is causing slackness at the collieries. The Dominion Coal Company announces that it has received cancellation of export orders from the Dutch Government, fulfillment of which was prevented by the export embargo imposed by the Railway Commissioners in the Summer. In the closed season of navigation, this reduces the outlet for coal production to the requirements of the Maritime Provinces and coal stored in the banks. The Company states that it is the intention "to bank a large quantity "of coal with the hope that it may be able to enter the "Montreal market next Summer, but as the United "States competition is very keen there is no assurance "that with the present high cost of production Nova "Scotia will be able to compete."

Reduction of the working time of the collieries by half, and curtailment of the number of workmen employed in the machine shops, railway and construction departments will take place. Not since the winter of 1914-1915 has there been any interruption to production from lack of outlet. It is becoming apparent that the rate of wages called for by the Montreal agreement is beyond the capacity of the Nova Scotian coal mines to pay if they desire to compete in other than purely local markets, and it is also higher than will enable the coal produced to be used in the manufacture of steel and steel products that have to compete with importations from the United States.

Fairly well-informed opinion looks forward to a revival of coal demand, and possibly also of steel demand by the Summer, but this anticipated revival will be based on a belief that selling prices are fair and more or less permanent after-war prices, and contracts will once more be awarded on a competitive basis, and will not be the result of insistent demand.

As the United States is the chief competitor of Nova Scotia coal in the Montreal market, it is significant to note that "Saward's Journal," a good authority on coal trade matters, states that the middle of January prices of lower-grade coal in the United States are now down to the cost of production, and prices of the better coals are in many cases approaching that point. It is fairly evident that with United States coal entrenched in the Montreal market after over five years unopposed dominance, any sales of Nova Scotian coal effected will, with the best of good will on the part of Canadian purchasers, be required to meet severe competition.

An underground fire in No. 1 Mine of the Inverness Coal & Railway Co., is reported to be under control.

The output of the Bras d'Or Coal Co., near Sydney Mines, during 1920, was 120,000 tons. This compares with 41,000 tons in 1919, and is a great advance on any previous annual production of this Company.

The output of the Milford Mining Company, Thorburn Pictou Co., during 1920, was 21,000 tons, about the same as last year. The property of this Company, which is controlled by Mr. Alex. Sutherland, has been acquired by the Acadia Coal Company. The property was held under a sub lease from the Nova Scotia Steel & Coal Co., which has holdings in Pictou County that it has not operated for a number of years.

The Greenwood Coal Co., at Thorburn, Pictou Co., had a production of 51,831 tons in 1920, comparing with 11,523 tons in 1919.

The "embargo" upon the freight of the steel companies in Nova Scotia, sought to be imposed by the employees of the Canadian National Railways, has been lifted. The action of the railwaymen in this instance is in complete contradiction to their traditional policy in Eastern Canada, and, generally speaking, the incident has been a puzzling one. It must have been obvious to the railwaymen's leaders that there was no advantage to be gained in striking for higher wages at a time when the impossibility of providing employment at any wages faced the steel companies.

Mining in Quebec in 1920

THEO. C. DENIS.*

Whether or not the total figures of mineral production of the province of Quebec for 1920 equal or surpass the 1919 production, will depend on the value of the building materials, and it is very difficult to foretell before hand what what this value will be. Quarrying, brick-making and cement manufacture have been active, but it is only from the returns of operators that figures can be arrived at.

Asbestos has held its own, and it is not expected that the production will show a great variation from last year's. During the first six months this industry was very active, and although somewhat hampered by the difficulties in obtaining cars for shipments, the tonnage and the value showed an advance as compared with the corresponding period of 1919. The demand was keen, the United States market absorbing almost all of it. The second half of the year was marked by the closing down of two of the important mines for a period of nearly five weeks, owing to a strike brought on by the exigencies of labour, to which the operators could not or would not acquiesce. The strike ended by the miners returning to work unconditionally, at the old terms and rates. During the three last months of the year the American market has appeared to be somewhat satiated, the demand and orders becoming perceptibly slower. This, however, had practically no effect on the prices, which kept firm, owing to the European demand, the English and French markets having had to be somewhat neglected during the previous months. The asbestos operators have taken advantage of this era of prosperity to push on development work, to block out reserves, and to improve methods of working. As an example, it may be mentioned that one of the companies has been putting down many thousand feet of diamond drill holes, has given a contract for the removal of 600,000 cubic yards of overburden to give access to the new ground and that they count on having a reserve blocked out for thirty year's mining, at the present rate of production. The figures for the first six months of 1920 show a production of asbestos and asbestic of 82,500 tons valued at 5,763,000 dollars, whereas for the previous twelve months, they were 160,000 tons valued at $10,995,000.

In the chromite industry two operators have shown their faith in its permanency by erecting some very substantial concentrating mills. One was built by the Mutual Chemical Company of Canada, mainly to treat their ore from their mine on lot 19 N. W. range X of Coleraine. This was started early in the year, and has given very good satisfaction. The second concentrator, which is built within a few hundred feet of the first, on the adjoining lot, is that of the J. V. Belanger Mining Co. and it has a capacity of 180 tons of ore a day, giving about 30 tons of chromite concentrates at 50 per cent. This was started in July, and the efficiency of the mill may be gathered from the facts that the shipments for the first month of operation of the mill totalled 600 tons of concentrates. Practically the whole production of this company went to the American Alloys Company. The Black Lake Asbestos & Chrome Co., worked their Caribou Lake mine during the early part of the year only. The production was limited to "crude", that is lump ore assaying from 35 to 40 per cent of sesquioxide.

The magnesite industry of Argenteuil county is now well established and two of the operators have erected very complete sintering plants near the quarries, for the production of dead-burned magnesite. The capacity of these two plants is 75 tons of finished product a day, requiring approximately 150 tons of crude magnesite. Heretofore the clinkering was done in cement plants, in Hull and in Montreal, which entailed railway transportation of the raw magnesite.

The mica industry has been active. Production will be higher than in the previous year. Quebec's output of this substance is approximately 80 per cent of the total Canadian output.

There has been a keen demand for felspar, both for ceramic purposes, and for enamelling. Several new deposits were opened during the year and shipped feldspar, mainly to pottery centres in the United States.

Pyrites mining has been very inactive, only the Weedon mine having been in operation. The Eustis mine has not reopened, having closed down in April 1919, after forty years of practically continuous exploitation. The market for iron pyrites for the manufacture of sulphiric acid has been very dull. The sulphur deposits of Louisiana and Texas have been increasing their production to a very great extent and this has had a marked effect on the demand for pyrites.

On the whole, metalliferous mining has keenly felt the drop in prices of all the metals. According to New York quotations, copper is now 28 per cent lower than in the early part of the year; zinc has dropped 34 per cent and lead 45 per cent as compared with prices in February and March, and the operations of our mines of these metals have decreased in proportion. Nevertheless the Zinc Company worked their Montauban mine, with comparatively few interruptions, and the Federal Zinc Company, who are developing a very promising deposit of zinc and lead ore in Gaspé county, worked actively on the construction of the road, 42 miles long, which will connect the mine with the railway and enable them to haul the concentrates by tractor.

Very little prospecting was carried on during the year, and practically no development work was done on the gold occurrences of Lake de Montigny, in the Abitibi region.

NOTE.—The foregoing note was prepared by Mr. Denis for inclusion in the Annual Review issue of January 7th, but was by oversight omitted, which we regret.—Ed.

*Superintendent of Mines for Province of Quebec.

PERSONAL.

Mr. Edgar Stansfield, who has for many years been the Chief Chemist of the Mines Branch at Ottawa, and is well-known through his work in connection with lignite briquetting, has entered the service of the Government of Alberta to take charge of the chemical part of the extensive investigation on Alberta coals which the Provincial Government proposes to undertake in conjunction with the staff of the University of Alberta at Edmonton.

British Columbia Mineral Production in 1920

Abstract of the Preliminary Review and Estimate Issued by the Minister of Mines.

With a production valued at $35,580,625 for 1920, which is $2,284,312 greater than the 1919 figure, British Columbia once more takes a foremost place among the mining provinces of Canada; in fact it is doubtful whether any other mineral producing area of the Continent will be in a position to report more than a 7 per cent increase over the output of the previous year.

The foregoing statement is based on statistics furnished by the Preliminary Review and Estimate for 1920 just issued by Hon. Wm. Sloan, Minister of Mines. Besides the chief point that the industry as a whole shows a 7 per cent monetary improvement over the result of 1919 it is set out that there has been an increase in the amount of silver produced of 1,807 oz. —3,404,926 as against 3,403,119 oz. — although in value, owing to the falling world quotations, there has been a decline of $327,349; that there have been 314,-321 lbs. more Copper produced than in 1919—42,773,-660 as against 42,459,339—although in value, again owing to the decline in prices, there is a reduction of $454,506; and that in Lead there has been a decline in quantity of 7,930,921 lbs—21,545,047 as against 29,-475,968—but an increase in valuation, because of improved prices, of $13,616.

But, in connection with metalliferous mining, the most noteworthy fact is the development of the Zinc industry. There was an increase of output in 1920 over 1919 or 20,027,617 lbs, the figures for the two last years being, 1919—56,737,651 lbs; 1920—76,765,268 lbs. In volue the improvement is estimated at $1,-602,843.

The explanation of this is found, beyond a doubt, in the enlargement of operations in connection with the Sullivan Mine, East Kootenay, and the activity of the Trail Smelter. Mr. Sloan in his report says with reference to this matter that the growth of this branch of the mining industry is due to the greater production of the Sullivan and that "during the last half of the year in other places there has been little or no market for zinc ore, and a very small volume of sales of the metal; several of the larger zinc mines and refineries in the United States closed down early in the fall."

In Gold production, both placer and lode, the comparison is not as favorable. There is a decline in placer output of 1075 oz.—13,250 as against 14,325 oz. —and in lode gold it amounts to 34,250 oz., 118,176 as against 152,426 oz. In monetary terms the difference amounts to $21,500 in respect of the placer and to $707,947 in respect of the lode product.

"This might have been expected" the Minister of Mines report explains "as the mining of Gold, with its fixed value, has in these times of high cost of labour and supplies for some years past offered little encouragement and even less at the beginning of this year, on the eve of what promised to be a period of unstable prices. With what is now an assured promise of lower costs of supplies and living it would seem that gold mining would again become profitable and we may confidently look for an increased gold production in the near future."

With further reference to this matter Mr. Sloan maintained that recent amendments to the Placer Mining Act might be expected to bring considerable areas of the placers of the Province, for years inactive, under development. There were many indications that hydraulic and dredging operations would be undertaken in the large placer-fields of the northeastern interior on such a scale that the effect on the annual production would be notable. There was no doubt, too, the adverse economic conditions, with respect to gold mining, conditions responsible for the closing down of such a well-known and large producing mine as the Nickel Plate of Hedley, were improving. He looked for a return to a normal rate of production as regards the lode gold mines and for such further development, in both placer and lode gold mining during the year, as would materially advance the production of 1921.

Dealing with the Silver production Mr. Sloan said that it was particularly gratifying to find that in quantity the output was slightly greater than in the previous year for the reason that the result was unexpected by many because of the closing down of a number of the mines of the Slocan District. A disagreement between the employers and the employees had led to the practical closing down of a number of the mines of this section for a great part of the year. Inasmuch as it was this mineral area that is responsible for a large proportion of the silver production of the Province it was thought, naturally, that it would be impossible to overcome the setback thus received. But, as pointed out, those so figuring were not making sufficient allowance for the productivity of the mineral areas of the northern coast sections the properties of which have taken a place as producers comparatively recently. One of the chief of these was the Dolly Varden, of Alice Arm, the output of which, from the 1st of September 1919 to the 30th of September 1920 amounted to 1,170,000 ounces. Added to this was the product of the Premier Mine, Portland Canal Mining Division.

In considering the whole question of the results of the year's effort in metalliferous mining Mr. Sloan said:

"It is extremely gratifying that British Columbia's Mining Industry has been so well maintained, notwithstanding the fluctuating metal market, and despite generally unsettled conditions, that it is possible to report an increase in 1920 over the value of the production of 1919. It is to be remembered, too, that other mineral producing sections of America have, of late, been announcing deductions in mineral output, a fact which emphasizes the very satisfactory showing of this Province."

There had been in recent months a considerable drop in metal prices as compared with those of war days. As mining costs had not yet declined in the same proportion, the producing mines had suffered some embarrassment and recently the output, especially of copper, had been cut down. As had been predicted, however, in respect of gold, it might also be said in regard to the production of the base metals that conditions gradually were on the mend. Mr. Sloan stated that he was not one of those who viewed the future pessimistically. Such a sentiment was in no way justified

Present conditions were but a passing phase of war aftermath which history taught was to be expected and which shortly would be forgotten with the return of industrial stability. Meanwhile it was re-assuring that in the face of untoward conditions the metalliferous mines of the Province as a whole had been able to make an increase over the previous year of $105,157, their estimated production amounting to $20,142,155.

Mr. Sloan was enthusiastic in reference to the splendid showing made by the collieries of the Province. In coal there had been an increase of 444,487 tons in 1920 over 1919—2,712,228 as against 2,267,541 tons. Reduced to monetary terms this meant an improvement of $2,223,435. The output of coke was down somewhat, the production being 68,190 tons as compared to 91,138 tons in 1919, a decrease in value of $160,636.

To Mr. Sloan this manifestation of increased productivity on the part of the collieries of British Columbia is one of the most satisfactory features of the 1920 report. He expresses the opinion that coal once more is coming into its own, that it is going to take the place of fuel oil to a greater and greater extent from this time forward, and that the development of the industry during the past year is but the beginning of a period of sustained productivity and prosperity to the coal fields of the Province. That the collieries at present in a position to turn out this fuel should be prepared to take advantage of the enlargement of both the domestic and foreign markets is his opinion. They should make preparations to develop their coal areas, to the utmost. It was apparent that the immense coal resources of British Columbia were not going to lie practically dormant for much longer.

It is interesting to note, in this connection, that the returns for the month of December, as far as available, indicate that the rate of production is being well maintained. For the month of November the output totalled 261,608 tons while, with the production of the Crow's Nest Pass Collieries for December estimated, that for the past month will reach at least 240,000 tons. The figures for the Vancouver Island collieries for December follow:

	Tons.
Canadian Western Fuel Co., Nanaimo	52,796
Canadian Collieries (D) Ltd., Comox	42,761
Canadian Collieries Ltd., South Wellington	7,512
Canadian Collieries Ltd, Extension	17,054
Pacific Coast Coal Mines	3,205
Nanoose Wellington Coal Mines	3,287
Granby Consolidated Mining and Smelting & P. Co., Cassidy	18,279
Total	144,894

Following is the official table showing the estimated mineral production for 1920 as compared with that of the previous year:

Mineral Production for Two Years, 1919-20.

	Production, 1919.		Estimated Production, 1920.			
	Quantity.	Value.	Quantity.	Value.	Increase.	Decrease.
Gold, placer ..oz.	14,325	$ 286,500	13,250	$ 265,000	.....	$ 21,500
Gold, lode ..oz.	152,426	3,150,645	118,176	2,442,698	.....	707,947
Total gold	.....	$ 3,437,145	.....	$ 2,707,698	.....	$ 729,447
Silver ..oz.	3,403,119	3,592,673	3,404,920	3,265,324	.....	327,349
Copper ..lb.	42,459,339	7,939,896	42,773,660	7,485,390	.....	454,506
Lead ..lb.	29,475,968	1,526,855	21,546,047	1,540,471	$ 13,616	.....
Zinc ..lb.	56,737,651	3,540,429	76,765,268	5,143,272	1,062,843	.....
Total metalliferous...	.....	$20,036,998	.....	$20,142,155	$ 105,157	.....
Coal ..tons, 2,240 lb.	2,267,541	$11,337,705	2,712,228	$13,561,140	2,228,435	.....
Coke ..tons, 2,240 lb.	91,138	637,966	68,190	477,330	.....	$ 160,636
Total collieries	.....	$11,975,671	.....	$14,038,470	$ 2,062,799	.....
Miscellaneous and building material	.....	$ 1,283,644	.....	$ 1,400,000	116,356	.....
Total production	.....	$33,296,313	.....	$35,580,625	$ 2,284,312	.....

VANCOUVER NOTES.

Mr. J. M. Lay, Manager of the Imperial Bank at Vancouver, was elected President of the British Columbia Chamber of Mines at the Annual Meeting. The Secretary reported 321 members, which is a substantial increase over the membership of last year. In place of the technical lectures which were held last Winter, it was decided to arrange for a smaller number of popular lectures on the mining industry with moving pictures. The Chamber has for its object dissemination of accurate information regarding the mining industry of the Province, and welcomes visitors from all parts of the world to its rooms. New quarters have been acquired on Seymour St., Vancouver, and the Secretary solicits enquiries.

In order that the meetings shall not clash the Associated Boards of Trade of British Columbia has postponed a conference which was scheduled for the first week in February to give precedence to the meeting of the Canadian Institute of Mining and Metallurgy, which takes place on the 3rd, to 5th of February. In doing this, the Board of Trade has courteously recognised the importance of the Institute's meeting.

The Committee in charge of the coming meeting has decided to encourage full discussion of topical subjects which will be introduced by persons specially qualified, and the public is invited to all the sessions, except the opening business session.

The Rise of the Hollinger Mines

By J. A. McRAE, Cobalt.

The history of the Timmins-McMartin-Dunlap interests is unusual. These men all made money in mining silver at Cobalt. Unlike many who make small fortunes in mining ventures, they did not retire from the field, but, instead showed their confidence in the mineral resources of Northern Ontario by venturing into the Porcupine field, where gold discoveries of promise were made in 1910. They bought the Hollinger group of claims for $330,000, a mining prospect then of more or less uncertain merit.

The writer has secured from Mr. A. A. Cole, Mining Engineer of the T. & N. O. Ry. a photograph of the Hollinger prospect taken ten years ago, reproduced herewith because of its historic value. The quartz outcrop is one in which promising gold values were found, and on which one of the first tests pits were sunk. Mr. P. A. Robin, who up to the Spring of 1918 managed the operation of the mine, is seated on the outcrop.

In contrast with the condition shown by the photograph, the Hollinger Mine is now equipped with a mill

The Hollinger Mine Ten Years Ago.

capable of treating from 3,000 to 3,500 tons daily, and can employ close upon 2,000 men when operating at full capacity. The ore carries an average of about $9 per ton in gold.

In the past two years, the production from this property has averaged upwards of $580,000 per month. Total output to date has amounted to close to $39,000,000 and the ore blocked out in reserve exceeds the total so far mined. A total of 77 veins have been discovered, of which 38 are being developed, and with 39 so far undeveloped below the 100-ft level.

Estimating an average of 3,250 tons every twenty-four hours, and a recovery of $8.50 in gold per ton treated, the Hollinger Consolidated is now equipped to treat approximately 1,190,000 tons and to produce about $10,000,000 yearly in gold.

The discovery of the Hollinger mine by the late "Benny" Hollinger in 1909 is one of the chapters which offers inducement to prospectors in Northern Ontario. Benny was a comparative "tenderfoot" in the prospecting game at the time he made the find, and his success is a star toward which many another prospector has directed attention and pinned his highest hope.

The subsequent development of the property constitutes a similar example for those who have money, confidence in the great mineral resources of Northern Ontario, and the courage of their convictions.

In a period of ten years, an important gold mining industry has sprung into being in the Porcupine and surrounding districts. Rock formations over an enormous area are such as to encourage the belief that other Hollingers may be found, if indeed, not already in the making among one or another of the large number of other mines entering the producing stage, or in a state of exploration and development such as that shown in the accompanying photograph.

Every mining enterprise has a more or less humble beginning. Every producing mine was once but a mining prospect, of quite uncertain merit and requiring courage on the part of its owners to spend the necessary money to carry on the required exploration and development work. The Hollinger Consolidated was no exception, although nearly $80,000,000 has been either produced or blocked-out, with the mine still young.

The Hollinger Mines Today.

Northern Ontario Letter

THE SILVER MINES.

The Cobalt District.

One of the most important developments in recent weeks has occurred on the first level of the University property of the La Rose Consolidated. A new ore-shoot has been encountered, from which high-grade ore is being bagged. The vein is from two to four inches in width, and is exceptionally rich. It occurs in the Huronian slate formation and is believed to be the westerly continuation of a vein formerly worked at that level. This new find, together with the favorable developments during the closing months of the past year offers promise of the University being a quite heavy producer during the current year.

There are indications that the Hudson Bay mine may come to life again. Work at depth on this property, in the Conglomerate area some little distance from the contact, has resulted in opening up a comparatively large tonnage of mill rock, the average silver content of which is said to be richer than the usual run of low-grade. The Company recently negotiated a loan for the purpose of carrying on development work during the Winter. It is planned to resume ore shipments in the Spring.

It is understood the current supply of hydro-electric energy can be maintained throughout the Winter in the Cobalt district. The weather continues exceptionally mild, and at the middle of January the thermometer actually rose above the freezing point, but much colder weather followed.

One of the chief developments in connection with the economic operation of the mines in the Cobalt district is the announcement that wages would be reduced 75 cents daily, beginning Feb. 15th. In a statement to the Central Council of Employees, the Temiskaming Mine Managers' Association makes the following explanation:—

> "This Committee of the Mine Managers' Association has been asked to meet the Central Council and advise them of a decision regarding wages that the operators have been forced to make.
>
> "As you know, the price of silver is half of what it was a year ago and, as a consequence, about eighteen properties have been compelled to close entirely or suspend most of their operations, while those companies still maintaining their output have all reduced their working forces. Less than one thousand men are now employed in the camp, compared with about two thousand a year ago. The probabilities are that if costs are not reduced, more properties will be compelled to close and unemployment be further increased.
>
> "This situation has for some time past received very serious consideration by the operators, and as an essential step in the reduction of costs it is

their unanimous opinion that a cut of seventy-five cents per day on all classes of labor should be made, this decrease to become effective February 15th, 1921.

"It may be said that there has not been a sufficient reduction in the cost of living to justify this action, but unfortunately, the condition facing the camp of Cobalt is not one where the cost of living is a factor; it is rather a case of whether the mines at present operating shall be able to continue or be forced to shut down.

"The bonus was paid on the highest silver prices obtained, but was not reduced when silver declined, and the operators feel that they have more than lived up to their agreement.

"While they are reluctant to adopt the present course, it is forced upon them by conditions over which they have no control."

During the month of December, the Nipissing mine reports an output of $524,098, this being the highest record in the history of the mine, and setting the highest record ever established by any silver mine in the Dominion. Of this total, however, $224,204 is made up of cobalt metal, of which $199,424 had been produced in 1920 and not previously reported.

Apart from the cobalt metal reported, the silver production amounted to $299,894 during December, as compared with $190,219 in November and $184,578 in October, the increase being well over fifty per cent.

The Manager's regular monthly report to the President and Directors, states:—

"During the month of December the company mined ore of an estimated net value of $524,098 and shipped bullion from Nipissing and custom ores of an estimated net value of $378,222. The value of the silver production was estimated at 65¾ cents per ounce. Included in the value of the cobalt production is an item of $199,434, representing value of residue produced in 1920 and not heretofore reported."

During the week ended Jan. 14th, the Coniagas was the only mine to ship ore, this company sending out two cars containing a total of approximately 125,827 pounds. One car went to Thorold and the other to Perth Amboy.

During the corresponding period, no bullion shipments were reported, although it is noted that the Mining Corporation sent out 99 bars containing 101,100 ozs. on December 31st, this shipment not having been reported in this paper for the week in which it occurred.

The Gowganda District.

A shipment of high grade ore is in course of transportation from the Castle property of the Trethewey Company. About 378 bags are contained in the shipment, the weight being about 17 tons. This is the largest shipment so far made from the Castle. It is understood the property is in a very encouraging physical condition.

The Miller Lake O'Brien is also making a shipment of ore this month, and will send out a carload, part high-grade and part concentrates. This shipment is now being hauled over the sleigh road to the railroad at Elk Lake.

South Lorrain Area.

Arrangements are to be made to resume operations on the Keeley Silver Mines in the early Spring. This was discontinued last fall owing to the shortage of power. Although the electric energy now available would permit operations to resume, yet the difficulties of re-opening at this season would be great, and no effort will be made to do so until Spring. The newly-installed mill may then be set in operation.

A small force of men are at work on the Haileybury Frontier property. Effort is being directed toward the exploration and development of large veins in which cobalt metal occurs. The plan is to mine the cobalt and possibly recover a certain amount of silver as a by-product.

THE GOLD MINES.

January tonnage going through the mills at the mines of the Porcupine district has been reduced considerably as compared with December. The Hollinger treated upwards of 2,000 tons daily during the closing month of 1920, but owing to power shortage has curtailed to under 1,500 tons daily this month. The distribution of the available 4,000 h.p. of electric energy, among all the mines, together with the auxiliary power being generated has caused an average reduction in tonnage of about thirty per cent.

The Dome Mines has reduced to about 500 tons or under, as compared with from 700 to 1,000 tons during the past several months. The condition of the treasury, however, is believed to assure dividends without interruption, and with the probability of production at full blast about May.

In connections with the proposal to consolidate the Northerown Mines and the Porcupine V. N. T., the entire outline of the proposal was discussed at a recent meeting, and Major P. McIntosh Bell, of the Porcupine V. N. T., has gone to London to present the matter to the English interests who are in control of that company. It is generally believed the merger will be carried through, and the big enterprise may actually be under way by next Spring.

Considerable work is to be done on the property of the Union Mining Corporation, situated in the township of Whitesides, some 30 miles south west from Porcupine. This concern is stated to have arranged for an extensive diamond drilling campaign, in addition to sinking operations. It is planned to carry the main shaft to a depth of 500 feet, with working levels at each 100 feet. The work of erecting camp-buildings has been almost completed, and mining machinery is to be installed this Winter. The contract for freighting in the large amount of supplies and equipment has been let to Alex. Corrigan, of Porcupine, while the contract to do the sinking has been secured by H. McQuarrie. A meeting of the directors was recently held in Toronto at which the present plan of operation was endorsed.

The annual meeting of the Tough Oakes Gold Mines will be held near the end of this month. Important changes are reported to be pending on the directorate. It is understood this change will be the first step preliminary to outlining a policy of operations commencing next Spring. Capt. Jorgensen, representing the English interests in control of the Tough Oakes, is understood to have sailed from Liverpool on Jan. 15th and will be present at the meeting. It is believed less secrecy will surround the plans of the new Kirkland Lake Proprietary, 1919 following the contemplated change on the directorate and the assumption of control by the new Company. It is understood also that more or less complete details may be forthcoming in relation to the progress made in the [illegible]

includes the Tough-Oakes, Burnside, Sudbury Syndicate, Aladdin-Cobalt, and possibly the Sylvanite.

Among the properties on which work may be resumed within the next few weeks in the Boston Creek district are the Boston-Kennedy, Boston-McCrea and the Allied Gold Mines. These thre promising prospects lie adjacent to the Miller Independence on the East, West and North.

HUDSON BAY MINE NOT CLOSED DOWN.

Our Cobalt correspondent included the Hudson Bay Mine with others, in his communication of last week, as being closed down, but the "Journal" is informed by the Secretary that this is not the case, the mine being working steadily with no intention of closing down. The Mill is closed, but underground work is being continued as usual, and a satisfactory tonnage of ore is being broken against the starting of the Mill in the Spring. We are glad to make this correction.

DAVIDSON CONSOLIDATED GOLD MINES TO BE ACQUIRED BY ENGLISH SYNDICATE.

Shareholders of the Davidson Consolidated Gold Mines met in Toronto on Jan. 17 and reached the decision to sell the property to an English syndicate which has purchased one million shares of one dollar par value of Treasury stock at 75c a share, and will buy in the outstanding stock in the hands of the shareholders at $1.18 a share. It is stated that the intention of the mine is to reopen the mine on March 1 with ample funds to carry on the work and erect a 500-ton mill. The money necessary to the deal is to be paid by the end of March, the proposal having been changed to cash from the previous option plan. At the meeting, S. R. Kean, of Toronto, was elected as a director, the others on the board being G. C. Crean, H. H. Sutherland, Toronto; C. W. Moodie, Hamilton; E. A. Snowman, Springfield; J. J. Davis, London, and Col. Robert Stark, of Montreal. The financial statement read at the meeting showed assets of $4,057,265 made up of plant and equipment $74,401; developing expenses $237,660; gold receipts since last meeting $17,069 and property $3,556,810. The liabilities total $57,260, and the largest item is $31,121, money advanced by F. C. Sutherland & Co. The report of the mining engineer who examined the property for the English syndicate described the mine as one of immense possibilities.

TORONTO METAL QUOTATIONS.

	Jan. 20th. Cents per lb.
Copper, Electro	18
Copper, casting	17¾
Tin	46
Lead	7
Zinc	8
Aluminium	32
Antimony	8

Mr. Wm. Frecheville, past-president of the Institution of Mining and Metallurgy (London, England), and late Dean of the Mining School of the Imperial College of Science, one of the foremost mining engineers of Great Britain is expected to visit Canada within the next few weeks.

TORONTO MINING STOCK QUOTATIONS.

Quotations on Active Stocks on Standard Stock Stock Exchange for week ending 15th January, 1921.

Silver.	High.	Low	Last.
Adanac Silver Mines, Ltd	2⅛	1¾	2⅛
Bailey	4½	4	4
Beaver Consolidated	33	26	32
Chalmers-Ferland	6	6	6
Coniagas	2.18	2.00	2.00
Crown Reserve	18	16½	17½
Gifford	1⅛	1⅛	1⅛
Hargraves	3	2½	2½
La Rose	33	22	33
McKin.-Dar.-Savage	31	28	29
Mining Corp. of Can.	1.25	.95	.95
Nipissing	9.00	8.50	9.00
Ophir	1¾	1¾	1¾
Peterson Lake	12	10	12
Temiskaming	25½	25	25
Trethewey	20½	16½	20
Gold.			
Apex	2½	2	2
Atlas	21	16	16
Dome Extension	45	43	45
Dome Lake	3½	2½	3½
Dome Mines	13.50	13.00	13.50
Gold Reef	3½	3	3½
Hollinger Cons	6.25	5.80	6.10
Keora	22½	19	20½
Kirkland Lake	51	40	47
Lake Shore M. Ltd.	1.20	1.07	1.15
McIntyre	1.85	1.81	1.81
Moneta	11	9½	11
Newray Mines, Ltd.	5	5	5
Porcupine Crown	20½	18	20½
Porcupine V.N.T.	22	18	22
Schumacher	21½	20	20
Teck-Hughes	11.4	11	11½
Thompson Krist	7¾	6½	7½
West Dome	8¾	6⅝	8¾
West Tree Mines, Ltd.	6	5½	6
Oils.			
Ajax Oil	27	20	20
Petrol Oil, The	35	35	35
Rockwood Oil, Gas	2⅞	2⅞	2⅞
Vacuum G	13	11¾	12½

MONTREAL METAL MARKETS.

Fair prices of Ingot Metals at Montreal, in less than carload lots.

	Jan. 19	Jan. 12.
Copper, Electro	19	19
Copper, Castings	18¾	18½
Tin	40	44
Lead	6½	6¾
Zinc	7¼	7½
Aluminium	34	35
Antimony	7¾	8

Toronto Coal Prices.

Toronto, Jan. 20. There are indications of a coming stiffening of the market due to colder weather conditions, and the closing down of a number of mine which were unable to produce coal at present prices. Anthracite coal is quoted at $9.50 to $11.00; smokeless $9.00 to $10.00; slack, $7.50 to $8.00, lump, $8.00 to $8.50.

A Montreal Letter

By ALEXANDER GRAY.

"Under-Consumption" the Most Pressing.

Two such outstanding figures as Col. Thompson and Judge Gary have clearly indicated that pessimism can be carried to extremes. One speaks for mining industrialism—the other for the steel and coal trades. Were their opinions inconclusive, it is necessary only to quote that other personality, Mr. A. C. Bedford, Chairman of the board of directors of the Standard Oil Company of New Jersey, who has first call upon every material fact in the States, and has just returned from a study of the European situation. Mr. Bedford is sponsor for the greatest mineral industry—an industry that found it convenient to do some unprecedented financing owing to the acute credit position. He is constructively optimistic and holds that the ills of the world are due chiefly not to over-production, but to under-consumption, because Europe lacks the capital to buy necessities. He compares the Continent of Europe with a manufacturing plant with all machinery and facilities, but without raw materials, which are unobtainable except through the extension of long-time credits. In other words, once business interests have rehabilitated the world, (to do which "real peace must be established") — the "economic equilibrium will be restored".

Messrs. Thompson, Gary and Bedford—representing copper, steel, coal, and the allied trades, and oil and its by-products,—are not at all lachrymose. To the contrary. Resumption of great buying power, of huge consumption, may not come along on the "double quick"—and yet it is assured, if, as Mr. Bedford asserts, "sweeping reductions are made in Government expenditures, and if Governments forego costly experiments in conducting business, and leave the business of the world to be done by business men, governed by the basic laws of trade, the laws of free and fair competition".

These are the sentiments of thoughtful leaders like Otto Kahn. Of course those gentlemen have decided advantages in "free and fair competition". Nevertheless they dispel gloom. Every mineral industry in Canada will be required to accept their formula-produce at the lowest cost, and supply the impecunious nations with raw materials at least. Already the jam is about broken. Arrangements are being made in the States for foreign loans amounting to $300,000,000 —a dole—but a start.

Too Much Gold — Too Little Credit.

Whether or not the United States want all of it, they are getting gold from the four quarters of the globe, India being the latest contributor. Already in possession of more than half the gold in circulation and silver being offered so freely by the Orient that the price slumped, business interests and financiers across the border would as lieve forego their privilege of getting gold in liquidation of already outstanding obligations or in payment for new supplies. American exchange is so high, buyers abroad cannot avail of it as a luxury—even though the States be the one free market in gold. Yet weekly receipts of the yellow metal are announced, while Washington has more gold than it wishes for. The emergency having arisen, the Orient at least is having something by delivering what it asked for when exchange was high in the East, owing to Allied purchases. If the same could be said of the silver that has come out of the East of late, Asia in general might not have fared so badly on balance.

Anyhow the Washington Government and the Federal Reserve banking system have piled up gold until it is manifest there is a certain amount of embarrassment in being "all dolled up" and having "no place to go", as it were. Exports have fallen off and financing bills of exchange met with an embargo upon credits of this sort. Either exchange on London — sterling exchange — has to go up — or that on New York will have to be neutralized so as to balance international industrialism and permit of freer trading on credit.

Banks have found their glut of gold lacks action. Undoubtedly the volume of overseas credit—extended private trading interests since the Government put the lid upon official credits, had grown to such proportions that the banks became over-extended; for outstanding loans to their domestic institutions were excessive. It was this latter and the demand that precipitated the liquidation movement—and it was the foreign bills carried by the banks which have recently been attracting gold to this side. Last year United States exports totaled over eight billion dollars. The favorable balance of trade as reported amounted to over three billions. But the nearly four billions of private credits, in addition to official loans made previously, loans in general, as well as the huge quantities of undistributed war securities, together with European impoverishment, brought things to an impasse.

Appreciation of sterling exchange, and of American exchange forced trading issues. The Continental manufacturer or trader declined to purchase. The United Kingdom could not finance the Continental and American positions. Canada has purchased and borrowed so heavily in the States, while production has been slowing down, exchange has been prohibitive. That is why Sir Henry Drayton strenuously is urging economies and buying of domestic commodities and materials. Sir Edmund Walker, in his Annual Report as President of the Canadian Bank of Commerce, also points out the unwisdom of underproduction at home and excessive imports of what can be made here. Furthermore, Sir Edmund, whose annual utterances are unfailing in their consideration for the mineral industries, took firm ground in the matter of greater production and more extensive research. Among other things, he said:

"We have iron ores in plenty, but we do not spend enough on research to ascertain their status in relation to other ores in the United States on which we steadily depend. We have about 5 per cent. of the coal areas of the world, so far as such areas are accurately known. It may be that science cannot remove impurities and reassemble the coal so as to make transportation charges possible, and thus relieve Ontario of its great drawback, and the nation of its vast expenditure for the importation of this article, but research should be persistent until we are assured that such is the case. We have lately developed manufacturing processes in which chemistry is the main feature and others dependent on cheap water power, and through these the triple benefit comes to us of giving employment, of enlarging the market for those who sell food and the other necessaries of life, and of offsetting or lessening by the selling value of the home created product, the cost of those imports which are the main cause of our present difficulties. We are very glad indeed that our Dominion and Provincial Governments all spend large sums of

money in educational and other ways, to aid agriculture. The Dominion Government and some of the provinces also do something in the way of research for other industries, but we have come to a juncture where, along with the ordinary desire for progress, comes the heavy pressure of national debt which can only be relieved by increased production. For this we need research in countless directions and in addition to what is now being done, I hope liberal aid will be given to all of our universities and that the scope of our Government research work may be enlarged.

More hardly could be conveyed to the Dominion and Provincial Governments and all concerned with industrial activities, sustained by scientific effort. To reach the goal of our ambitions, domestic policies will have to be more aggressive with regard to natural resources and the finished products thereof. In a nutshell Sir Edmund evolved a programme that will have to be lived up to. First and foremost he places coal and iron. Water powers are self-evident. To give impetus, however, more prominence should be given to special and precious metals. Increased gold production is a prerequisite—and that is coming. Wages are rather high for economical operations in metal mines. At the moment, and temporarily, more miners are seeking employment than can be put to work, owing to the power shortage. Beginning about two months hence, it is expected that the Hollinger, Dome, McIntyre, of Porcupine, and Lake Shore, and the others, of Kirkland Lake, will be able to give a demonstration. Nor will Cobalt and the Montreal River properties be laggard. Precious metals are vital while international exchange markets are adverse to Canada. And the base metals will participate in the broader activities confidently anticipated in the coming Spring and Summer. Influential copper interests are bestirring themselves.

What the Premiums on Bullion Brought.

Vice President Pease of the Royal Bank of Canada touched upon the matter of Canada's exchange relations with the United States during the past year. He considered they "have been fairly stable compared with those of other countries with the United States. The premium on American funds ranged from eight to nineteen per cent. during the year, and is now 15 per cent. Contrast this with the discount on other currencies in New York on December 31st: Sterling 27 per cent., French Exchange 69 per cent., and Italian Exchange 82 per cent". Had Mr. Pease stated the average for the year, the exact premium on gold and silver shipped to the States could be approximately given. Assuming the average at 10-11 per cent., the extraordinary revenue from this source accruing to the gold and silver mines was from $2,000,000 to $2,250,000. Of that, the gold mines got about $1,200,000, and the silver mines correspondingly. Hollinger, in this way, probably netted from $625,000 to $650,000.

PHYSICAL PROPERTIES OF NICKEL.

"Chemical & Metallurgical Engineering" of New York for January 12th contains a paper on the physical properties of pure nickel by Paul D. Merica, Superintendent of Research, International Nickel Company, which is published by permission of the Director of the United States Bureau of Standards. The article is a compilation of literature references, and original and unpublished work on the various physical, mechanical, thermal, electrical and optical properties of pure nickel.

BOOK REVIEW.

Pumping by Compressed Air.—By Edmund Ivens. Second revised edition 1920. Cloth Boards, 9 by 6 in. 266 pp. with Index. John Wiley & Sons, New York.

This work does not deal with the common use of compressed-air as a substitute for steam in operating direct-acting pumps situated underground, but with such uses of compressed air as the displacement pump, and the air-lift. As the author states, there is very little literature on this phase of the use of compressed air, and there is very little to be found in mining text-books. The history, types and the mathematical theory of the air-lift are very fully dealt with. The book will be of value to those directing operations at mines where, owing to local conditions, the displacement pump or air-lift principle is employed in pumping, of water, or semi-liquids containing gritty or corrosive substances. We do not remember having seen such collected and extended treatment of compressed-air pumping in other text-books.

COAL IN GREAT BRITAIN: The Composition, Structure and Resources of the Coal Fields, Visible and Concealed, of Great Britain. By Walcot Gibson. Demy octavo. 50 figures and 8 plates. Edward Arnold, London, 1920. Price 21/-net.

While Dr. Gibson's work deals in particular with British coalfields, which from his connection with the Geological Survey of Great Britain he is uniquely qualified to discuss, it is also an important contribution to the geology of coal generally. Part of the work is reproduced, with many additions, from the author's earlier work on the "Geology of Coal and Coal-Mining, which formed the first volume of Arnold's Geological Series, and is now out of print. The book is stated by Dr. Gibson to be a condensation of personal observations in the field extending over a period of thirty years. The treatment of coal geology, which covers its chemical and physical properties, formation and origin, distribution, and the use of fossils as zonal indices may at first sight appear to be slight in extent, but perusal will show that Dr. Gibson has condensed his facts in a manner that only a master of his subject dare attempt. Such condensation entails far greater experience and labor than much more discursive treatment, and more can be learnt from the first eight chapters of this work than from many more voluminous treatise on coal geology.

As bearing on the anthracitization of the Cretaceous coals of the West when approaching the folded zones near the Rocky Mountains, several similar instances are mentioned.

Actual thermal effect from contact with igneous intrusions seems to be limited in range, and mention is made of coal seams in South Wales which remain unaltered to within a few feet of a huge lacollitic mass of igneous rocks. While the author does not deal definitely with the suggestion that the original vegetable material was different in the case of true anthracite and humic coals, he states that recent researches, especially those of M. Renault, "indicate that very "different degrees of alteration may be effected by "biological action prior to entombment, while the subsequent mechanical and physical changes may be relatively trifling, and many paleobotanists doubt if "peat, lignite, coal and anthracite indicate a succeeding series in the process of coalification." It is pointed out that some compound coal seams, such as the Barnsley Coal of Yorkshire, consist partly of a high-

ly bituminous coal and partly of anthracities coal. A good many examples could be given of this nature.

A feature of the work are the half-tone plates of fossil plants reproduced in natural size. Dealing with the use of fossil plants in defining stratigraphical horizons, Dr. Gibson points out that while they can be regarded as indications of a higher or lower order in the general sequence of the Coal Measures, they are only of local significance in the determination of the position of one stratum. Plants are therefore, concludes the author, of service only as an index to horizon in a broad and general sense. With mollusca it is different because of the existence of two distinct types, marine and estuairine of fresh-water types. In an area of practically continuous deposition, such as Britain was in the Coal Measure period, the "mussel-beds" are a very useful horizon index. "The determination "of horizons in the Coal Measures by means of fossils", "states Dr. Gibson, whether plant or animal, perhaps "must be regarded as on trial, since the amount of "material to be dealt with is so great and active re-"search in many districts is not common..... it as "unwise at phesent to place complete confidence in "fossils as zonal indices in the Carboniferous sequence "as it is to cast entire discredit on the whole method." If a member of the Geological Survey of Great Britain is forced to state that in British coal mining explorations "the material has not even been examined for fossils" and for this reason to express such limited confidence in fossils as zonal indices, we can scarcely congratulate ourselves in Canada where virtually no recent literature exists in regard to the fossils associated with coal seams in the Dominion.

The importance of preserving the cores of drillings, and having the records of boreholes made by competent men is mentioned, not without good reason.

The chapter on the concealed coalfields of Britain is interesting as bearing on similarly concealed coalfields which will probably be discovered in such places as, for example, Nova Scotia, when the exhaustion of the seams now being worked stimulates the undertaking of such geological research and deduction as led to the discovery of coalfields in Britain, and indicates the presence of still undetermined coal seams there.

The book is desirable for any person interested in coal-mining who desires to fortify knowledge of his own district by the nature observations of one of the best informed geologists in Great Britain, where coal mining was first prosecuted, and where, consequently, the opportunities for observation and recording of facts have permitted their greatest accumulation. As a record of the position of the several British coalfields, the work would also interest that not inconsiderable body of men engaged in coal mining in Canada who came here from Great Britain, and may not have realised that in a comparatively short period Britain has enlarged the known area of coalfields, and that whole counties which a generation ago were purely agricultural are now prosperous coal-mining districts.

"The British Empire is still the most important trade factor in the world. . . Regarded either as a competitor or as an ally, Great Britain is by all odds the most important single factor in American life, and her political development is perhaps the thing which will best repay our (The United States) attention."

Edwin C. Eckel "Coal, Iron & War."

PORT ARTHUR NOTES.

By J. J. O'CONNOR.

Most encouraging results are being obtained from the preliminary development work being carried on at the Vimy Ridge gold property, situated two miles east of Schreiber, close to the railway right-of-way. This property received its famous name because of the fact that it happened to be recorded, on the day the Canadians fought and won the historic battle of Vimy Ridge.

The property is owned by Harry Harkness, of West Fort William, who has had a force of men engaged in development work that is being continued during the Winter, the ore taken out being carried to the nearest railway siding at Blue Bird, about one mile east of the mine, in pack sacks.

Several tons of the ore have been shipped to Queen's University, at Kingston, Ontario, that have shown remarkable value. One ton shipped on November 20th, 1920, realized $118. This particular lot was the result of one blast, and was by no means hand-picked. Several assays of hand-picked samples have ranged up to $4,000 per ton.

Mr. Harkness states that he expects to begin shipping on a fairly large scale in the spring, when a wagon road will be constructed from the property to the railway siding, and the ore transported by teams. The nature of the ground is such, that a good wagon road, over which heavy loads may be carried, can be easily constructed.

Mr. J. W. Morgan, Mining Recorder, has been advised by Dr. W. L. Goodwin, that Prospectors Classes will open Tuesday, January 25th, at Port Arthur, and continue for two weeks. Quite a large number have signified their intention of taking instruction at these classes, by signing the register. Those signing come from various parts of the Port Arthur Mining Division, as well as from the local centres. This course, and the lectures accompany it are expected to be of signal benefit to the mineral interests of the district, by stimulating and encouraging an intelligent class of men to enter the mining field, equipped with the necessary knowledge.

BRITISH IRON FOUNDERS LOOKING FOR IRON ORE SUPPLIES ABROAD.

The "Mining Journal," of London, states that there are at the close of the year 100 idle blast furnaces in Great Britain, and attributes this slackness, not to lack of business, because it is stated that Britain is "starving for want of pig-iron," but to inadequate production of coal and coke.

The following reference to Canadian steel companies, and to the Wabana ore deposit, indicates that British steel makers are anxious about their ore supply. "There is little doubt but that the Wabana deposit is the largest available source of iron ore supply within convenient shipping distance of England, and, if consideration is confined to sources of supply within the British Empire, outside of Britain itself, it is virtually the only source of supply.

The comment referred to is as follows:

"But although the chief, the coal shortage has not been the sole restrictive influence at work in the iron and steel industry. Almost equally serious have been the dwindling supplies of native ironstone and limestone. This question of the maintenance of adequate

supplies of raw material has, in fact, become the main concern of the manufacturer, and the whole trend of events in recent years has been in the direction of the acquisition by the big steel producing firms of control over the sources of supply. Of this the most notable example in the past year has been the projected alliance between big British steel firms and the Dominion Steel Corporation of Canada, which would give home manufacturers access to and partial control over some of the richest mineral deposits in the world. High freights have as yet prevented a resumption upon a large scale of the shipment to England of the rich Wabana ores which are highly suitable for basic iron production, but one or two experimental shipments have been made to the Tees, and unless the alliance is abandoned, as is now reported to be likely, these ores, will again be shipped here as they were in pre-war days on a large scale, as soon as the now rapidly dwindling freights make it commercially profitable. Messrs. Dorman, Long & Co. Ltd, some time ago also acquired interests in the Itabira mines of South America, and other firms are questing further and further afield, Sweden, France, Spain, North Africa, Syria, the Caucasus, and far-off India, all being laid under regular tribute to keep up the flow of iron ore to the furnaces of Britain. At home, too, the quest continues, and deposits once thought too lean to be profitably worked are now engaging attention as the richer deposits approach exhaustion.

MAGNESITE MINING IN THE UNITED STATES DURING 1920.

(Bulletin of U.S. Geological Survey.)

The magnesite industry in the United States as a whole enjoyed a good year in 1920. The quantity of magnesite mined exceeded that mined in any previous year except 1917. Notwithstanding the contention made by the domestic producers in 1919 that without a tariff the market in the eastern part of the United States would be supplied with European magnesite and that companies which had made large investments in magnesite deposits and plants in California and Washington would be forced out of business, no tariff legislation was enacted, and the industry seemingly has not suffered disaster.

Preliminary figures reported by the United States Geological Survey, Department of the Interior, indicate that the production of crude magnesite in Washington was about 235,000 short tons, as compared with 106,200 tons in 1919. Practically all this was dead-burned and was sold as refractory material to steel companies and manufacturers of refractory products east of Chicago. The figures for California are not yet available but the output of crude magnesite in the State was about 60,000 tons. California and Washington are the only producing States, and the total output for the United States was therefore probably between 275,000 and 300,000 tons.

The imports entered for consumption from January 1 to September 30, 1920, amounted to 20,730 tons of crude and 10,439 tons of calcined magnesite, as compared with 6,381 tons crude and 9,471 tons calcined entered in 1919. Estimated as crude magnesite the imports for the first nine months of 1920 were about 41,600 tons, as compared with 25,300 tons in 1919. The imports in 1920 probably amounted to about 50,000 tons of crude magnesite, or double those of 1919.

On January 13, 1920, the Senate Finance Committee held a hearing at which users and importers of foreign magnesite presented their objections to a tariff on magnesite.

An investigation of the relations of time, temperature, and size of particles in the decomposition of magnesite was made during the year by the Bureau of Mines in co-operation with the Northwest Magnesite Co. at the mining experiment station at Berkeley, Calif. An electrically heated rotary furnace was used for these experiments in calcination, and the samples of crude magnesite used were obtained from mines in California and Washington.

Experiments with magnesite from Washington that has been used exclusively as refractory material are said to show that it is suitable also for use as plastic material, and preparations are being made to calcine it at the mines near Valley, Wash., for use in cement.

THE LATE DR. JAMES DOUGLAS.

Doctor, Chemist, Teacher, Preacher.

(From Chemical & Metallurgical Engineering).

In the Transactions of the Institution of Mining and Metallurgy of Great Britain for the years 1917-18 there is a necrological note of interest. It refers to one of their members born in Canada in 1837, the son of a Canadian surgeon. As a young man the late member planned to follow his father's footsteps, studied medicine in Canada and Germany, but on returning to Quebec he became professor of chemistry at Morrin College, Quebec, instead of practising his avowed profession. In the end neither medicine nor chemistry could hold his attention against what seemed a greater call, for he returned to Europe, this time to Scotland, where he matriculated and took the course in theology at the University of Edinburgh. In 1875, when he was thirty-eight years of age, he received his license to preach in the Presbyterian Church. He was not ordained in any pastorate, however, because just at that time his father's affairs, owing to unfortunate investments, called for his immediate presence in Canada again. He therefore returned and addressed himself to the problem of saving his father's property, but in order to provide for his own sustenance he became superintendent of an insane asylum, thus reverting in part to the practice of medicine again. Now, among the old doctor's investments that had gone wrong was the Harvey Hill copper mine in Quebec, which could never be developed into a great success—but it gave the junior doctor-clergyman both interest in and experience on the subject of copper mining and the treatment of copper ores. His work along this line led to his engagement, as a man of forty, to become superintendent of a chemical copper extraction plant in Pennsylvania where Western matte was treated. In 1880, being then forty-three years of age, he went West to pay a visit to a recently opened mine in Arizona, where he recognized a great future for the industry. Then he returned East and interested some of the partners of a leading metal firm in the enterprise, but endured four or five years of great uncertainty and anxiety before the tide turned. After this there followed nearly forty years of immense personal and professional success in the development of the American copper mining and smelting industry, in which he was recognized as a great leader. The metal firm to which we refer was Phelps, Dodge & Co., and the man whose history we have been sketching was none other than the late Dr. James Douglas.

PRESIDENT STILLMAN OF IMPERIAL OIL CO. ON PETROLEUM SUPPLY OF CANADA.

Mr. Stillman, President of the Imperial Oil Company, has given an interview to the New York newspapers in which he suggests the necessity that Canada should become self-sustaining in oil supply, and, what is more interesting, outlines a possibility that this may be so.

Mr. Stillman says: "The Canadian industry has a serious problem of its own. That problem is exchange. As one of the greatest factors in building up the markets of the United States, Canada should send to your country a much larger volume of goods and should be encouraged in this. At present, however, her purchases from the United States are over double her sales, and this and other circumstances have produced the depreciation of the Canadian dollar in New York.

"Canada produces only a portion of her annual consumption of petroleum. Canadian oil companies, in securing raw material, a major part of which comes from the United States and Mexico, must compete against all other importers from the United States for American funds in which to make their remittances.

"Imperial Oil, Ltd., and, I believe, some other Canadian companies as well, have been impelled by this circumstance and others to prosecute with increasing vigor the search for oil in Canada. In our case these activities have extended over a number of years and have covered a wide area, but without result except in one instance—the well at Fort Norman in Northwest territories.

"But for the existing world situation this well would have not much more than an academic interest, but necessity of making Canada self-sustaining in petroleum supplies has become so vital that no such indication of a field as presented by our expedition to Fort Norman can be neglected. To practical oil men it is hardly necessary to emphasize the obstacles confronting the making a commercial proposition of a well within 150 miles of the Arctic Circle and 1900 miles beyond the most northerly city in Canada. To complete the task will undoubtedly require years, but a beginning will be attempted this year.

"Manufacturers of petroleum products, like manufacturers of everything else, have a responsibility resting upon them to keep business on an even keel, and especially to demonstrate their consideration for labor. There is nothing as wasteful as giving a man a perfectly useless thing to do in order that he may be supported, but in times like these it seems to me the duty of those who command industry to exercise their utmost abilities in finding productive channels to direct surplus labor. On the other hand, the squeeze through which we are passing should eliminate the last traces of the malingering which in boom days put actual wages so far above their apparent level.

"I believe the reason the petroleum industry has suffered so slightly in comparison with others is its inherently sound position, and while we cannot expect to escape effects of business readjustments, I do not look into the future of the oil industry with any apprehension."

AN ENGLISH OIL SHALE COMPANY.

The annual meeting of English Oilfields, Ltd., discloses the beginnings of what may prove to be an important aid to British mining, and a source of petroleum production rivalling that of the Scotch oilfields. A report on the raw material by five well-known technicians estimated a possible profit of three pounds per ton of shale treated, and the Chairman anticipated that by June some 200 tons daily would be available. The shale deposits lie under shallow cover, and the original idea was to mine through shafts, but this has now been abandoned in favor of open-cast mining with mechanical shovels, by which method it is expected to lessen the estimated mining costs to a fifth. By the use of the Black retort a yield of from 29 to 30 gallons of oil per ton of shale is being regularly obtained. The presence of sulphur in the shale is not expected to oppose any insuperable difficulty, a statement that is distinctly at variance with one made by Dr. Alderson, of the Colorado School of Mines, on his return from a recent inspection of oil-shales in Britain. The shale deposits are very extensive, and the Company is purchasing freehold land outright, which carries with it the mining rights, and is necessary if the open-cast method is to be used.

In view of Britain's chronic petroleum deficiency, the development of these Norfolk oil-shales, is not of less interest than the discovery of a new coalfield in Britain.

LONDON CRITICISM OF NEWFOUNDLAND OIL PROJECT.

The following criticism of a Newfoundland oil flotation is taken from the "Petroleum Times" of London, and seems not wholly uncalled for. The only Hawke's Harbor shown on the map of Newfoundland that we can find is situated on the West Coast far up on the northern peninsula of Newfoundland facing Labrador and nearing the Straits of Belle Isle. The U. S. Geological Survey's Index to the Stratigraphy of North America shows the rocks to be a fringe of Cambrian or Ordovician strata along a boss of Laurentian rocks. This would not appear a favorable location for oil discovery.

Following is the London comment:

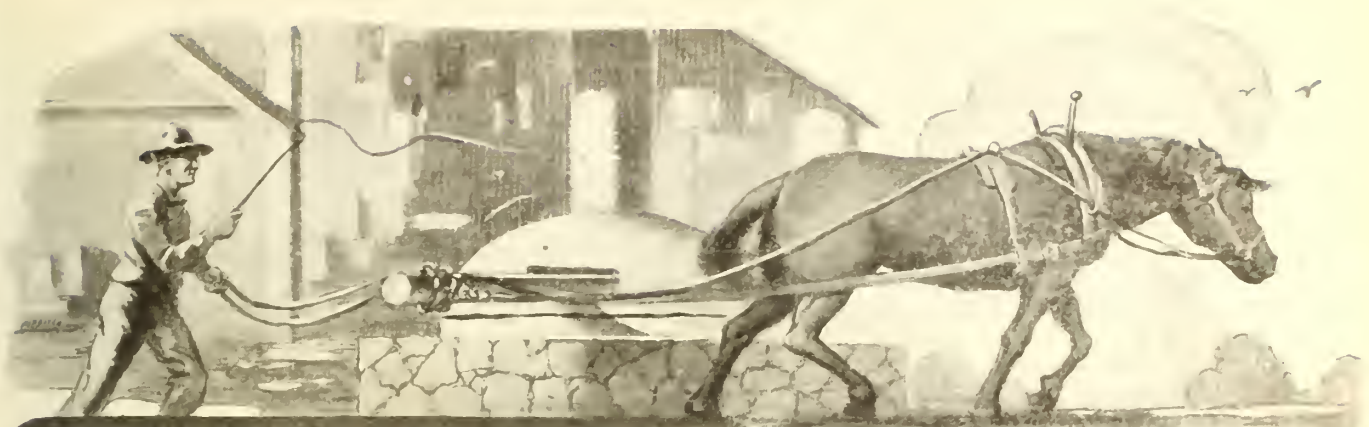
"Newfoundland Oil-Producing Company.—This "newly formed undertaking is pushing its own £1 "shares at par through the medium of circulars.

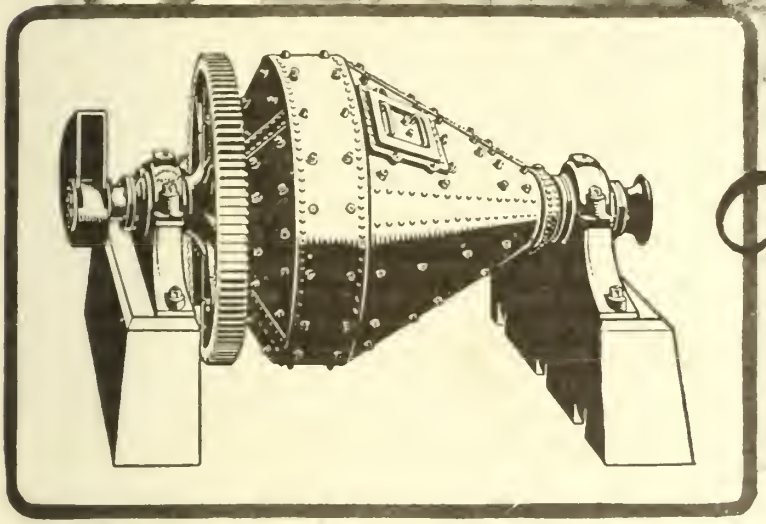
"The authorised capital is £50,000 in £1 shares, "25,000 being offered to the public and the balance "being credited as fully paid as purchase consider-"ation 'for the purpose of acquiring certain oil "lands comprising 9,600 acres situated at Hawke "Harbour in the Parsons Pond district of the "island of Newfoundland, also to acquire for the "colony a patent system of superheating steam, "etc.'

"According to the headline of the prospectus "there is 'a 75 per cent. dividend in sight'! The "people behind the venture prefer, however, to "give others the task of finding the capital.

"Of course, it is impossible on any grounds to "recommend a purchase of the shares: but this "does not mean that many people will not be "found who will send their money, inconceivable "as this might seem.

"Whilst giving space to this unsatisfactory "proposition, it will be of interest to mention that





When Labor was Cheap and Plentiful

The era of the $1.65 a day laborer lives only as a matter of memory. Labor is scarce and expensive. The labor payroll is approximately three times as great as in pre-war times. To reduce this enormous overhead is a problem for the Hardinge system of reduction.

Hardinge Conical Mills are automatic and continuous in operation. Many large mills throughout the country have batteries of as many as from twenty-five to sixty-four Hardinge Mills working continually requiring the attention of but one or two men per shift.

Compare this modern labor saving and power saving grinding system with the old horse-drawn abrasive method as pictured above. Actual statistics show that one Hardinge Mill requiring fifty H.P. reached a greater production than twelve of the horse drawn abrasive grinders which required two hundred and forty horse power and five men per shift. With the Hardinge Grinding System, the finished product is always uniform. There is practically no weak parts which require constant repairing.

The principle used in Hardinge Grinding is the first recognized grinding principle; crushing a smaller, softer material with one that was harder and heavier. The process of reduction is by stages, coarse material upon entering comes in contact with the largest balls which strike with the hardest impact. Automatically the material being ground flows to the narrower end and there meets the smaller balls. The required degree of fineness and the discharge end are reached simultaneously.

We will be glad to furnish you with any special grinding information.

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LONDON, ENGLAND SALISBURY HOUSE

Hardinge Conical Mills

"the prospectus of the concern appears very "familiar, and on examining certain particulars "given therein more closely there would appear "no doubt that this new venture is not unconnect-"ed with that other Newfoundland enterprise, the "Colonial Oil Development Syndicate, which was "commented upon in these columns on October "25th last, although the respective boards of dir-"ectors are not the same.

"Apart from anything else, there can be no real "market for such shares as these. Buyers should "take this point into consideration before parting "with their money."

"OF NO PAR VALUE."

A London Opinion On Shares So Designated.

A few weeks ago the International Petroleum Company of Toronto, which acts as the marketing concern of the Lobitos Oilfields, reorganised its capital and issued to its shareholders in exchange for their old scrip Preference shares of $5 each and Common shares "without nominal or par value." Still more recently news has arrived here of another Canadian undertaking, called the Three Rivers Pulp and Paper Company, whose Ordinary capital also consists of shares "of no par value." Both British and Dominion capitalists are understood to be interested in this enterprise, and the Common shares are offered as a bonus to subscribers to the Eight per Cent. Cumulative Participation Preferred $100 shares.

The Common share "without nominal or par value" is well known in Canada and the United States, and it seems we may now have the opportunity of getting acquainted with it here by importation from the latter country. Our own joint stock law precludes any such form of capital in a limited company, as the memorandum of association must state the nominal amount of share capital and the fixed amount of each share. There is, we believe, a tradition at Somerset House that some daring promoter once submitted the registration of a company part of whose capital consisted of shares of no denomination or value, and that the scandalised Registrar summarily rejected it.

Of what advantage is the share "of no par value," and why is it rather popular on the other side of the Atlantic? The only tangible advantage that appears to attach to it in the States is that in the case of an amalgamation involving an exchange of shares if scrip "of no par value" were received it would show no profit on the transaction which could be taxed, even though actually the recipient obtained something of much greater market worth than that which he surrendered. But this, after all, is a problematical benefit of restricted scope, and we cannot seriously believe that a company would be formed solely for the purpose of securing it. A more reasonable argument is that the share "of no par value" is a convenient type to allot as consideration for patent rights, secret processes, goodwill or other intangible assets, since any monetary valuation of such assets is thereby avoided. To the extent, therefore, that it discounts the overloading of a balance-sheet with dead items it is a class of share not without abstract merits.

We fancy, however, that much of the popularity of the share "of no par value" in America is due to the fact that it necessarily largely appeals to the speculative instinct in mankind. It is true a prospective purchaser must inquire pretty closely into the status of an undertaking issuing such shares, as the only criterion of their value is what they have earned in the past and what are their particular rights in a distribution of profits or assets. But assuming that roughly a reasonable value could be diagnosed, the investor, if of the plunging kind, would probably buy mainly for the reason that there was always a delightful element of uncertainty as to what return he would get and on what terms he might at any time sell. Such factors of gambling interest exist, of course, in every speculative share of fixed denomination, but naturally they must be more emphasised in the case of a type of scrip which its proprietors have ostentatiously forborne to place any value on, even in the act of creation.

The one good feature about the share "of no par value" is that you certainly could not persuade even a greenhorn to take it as representing assets of much worth, but when given as a bonus to Preferred or other shares of fixed nominal value we are not sure that it could not be used as a very good stalking-horse to work off a considerable amount of worthless scrip, which does not necessarily take unto itself any superior virtue by being merely given preferential rights. The moral of the whole subject is that no matter what may be the company or the character or denomination of its shares, the investor can never afford to omit an inquiry into the nature and record of the undertaking itself and into the character and personnel of its management. This is the only sound and reliable practice, and all substitutes are bound to yield inferior results. —"Financier" London.

A CHANGE FOR THE BETTER IN COPPER SITUATION.

Boston—W. F. Bartholomew, of Tucker, Bartholomew & Co., says of the copper situation:

There has been a change for the better in the copper situation which has been reflected in copper share prices. I have just received copper figures for 1920 which are as near official as can be obtained. They show:

	Pounds.
Total refined copper production	1,537,000,000
Total domestic and foreign sales	1,406,000,000
Total mine production	1,235,000,000

These figures show production of 64 per cent of 1917, while total refined copper output shows 61 per cent of 1917. Total refinery output exceeded sales by 131,000,000 pounds although total sales exceeded production by 71,000,000 pounds and these figures take no account of over 100,000,000 pounds of scrap copper that was remelted and sold in competition with new copper.

Copper has sold as low as 13c. by the big producers, but I do not believe much copper can be purchased at this price; in fact, I believe that copper will be selling at 17c. per pound within a few months, based on absolute scarcity of copper available for consumption in this country after European demands have been taken care of and inability to restore production in this country.

Copper stocks are selling below normal prices on a 14c. metal market, and with a prospective reduction in costs, through labor, supplies and taxes, I see a great improvement in store in net profits for the copper producers during the next few months.—"Boston News Bureau."

EDITORIAL

Our Knowledge of Coal Substance

This issue of the "Journal" contains a first instalment of a treatise prepared by Dr. Reinhardt Thiessen, Research Chemist of the United States Bureau of Mines at the Pittsburgh Experimental Station, for a meeting of the Coal Mining Institute of America, held at Pittsburgh on the 9th December 1920.

A perusal of this paper and the admirable summary of the progress towards fuller knowledge of coal substance by which it is prefaced, discloses the considerable contribution made by Canadian scientists, particularly the work of Sir J. W. Dawson of Pictou, Nova Scotia. Canada has an ancient and honorable record in coal-mining on the American continent. That father of modern geology, Sir Charles Lyall, in his record of his first and second visits to North Ameriea, acknowledges the assistance of the then young Dawson of Picton, and of the painstaking researches of an observant English mining engineer, Richard Brown, of Sydney Mines, to whose work, in conjunction with Mr. Binney, is due the identification of stigmaria as the roots of sigillaria. Probably the first coal commercially mined and sold in North America came from the coal seams of Cape Breton, and certainly some of the most permanent contributions to our understanding of the origin and substance of coal were made by Dawson and his confrères from observations of the coal deposits of Nova Scotia.

Dr. Thiessen points out that our knowledge of coal substance has been of slow and interrupted growth, in which he reflects the feeling of the searchers of earlier days.

In the preface to a work on "Coal" from the pen of Professor Thorpe, of Yorkshire College, Leeds, in 1878, is to be found the following expressive paragraph:

> "A generation has passed away since Joule
> "first determined the Mechanical Equivalent of
> "Heat, but the doctrine of the Correlation of
> "of Heat and Work has hardly yet come down
> "to the popular intelligence; nay, three genera-
> "tions have elapsed since Erasmus Darwin main-
> "tained that Coal was formed out of ancient
> "morasses and forests, but what proportion of
> "those who use Coal in these latter days know
> "anything of the mystery of its origin? If the
> "knowledge of these things is in future to spread
> "at no greater rate than this, it is to be feared
> "that our coal will be at an end before our peo-
> "ple have learned to know what it actually is,
> "how it has been formed, and what it can do."

In 1878 the production of coal in the United States was about sixty million tons. It is today ten times that quantity. That of Canada was about 700,000 tons—all from Nova Scotia. It is now twenty times greater

Can it be seriously advanced that modern knowledge of coal substance, of its combustion, of its intrinsic value, has advanced correspondingly to the extent of the increase in its production and use? Can it be said that Canada is making today the contributions towards coal technology that she did in days gone by? So far as can be learned, the Canadian contribution to the microscopic study of coal, to its fossil botany, and to the questions of coal deposition and the inter-related earth movements, have in recent years been quite small, and, since the work of Porter and Durley, on the analyses and combustion of Canadian Coals, there has not proceeded, from Canadian sources, anything comparable with the work of investigators in other countries.

It is understood that the Government of Alberta, through the faculty of the University of Alberta, proposes a series of investigations into Alberta coal deposits that shall avail themselves of the new instruments for coal research that are now obtainable. Alberta has coal reserves that are notable even in North America. A reservation of one mill per ton of coal produced in Alberta would produce an endowment fund, which, if applied to coal research in that Province, would some day return millions of dollars. We do not know of any mineral deposit in Canada that can compare for potential wealth, and in its bearing on Canada's future, with

the coal seams of Alberta. If a start were made today, while the coal industry is but a puling infant, astonishing things might be done when the industry becomes the commercial giant of Canada, as it inevitably must become; and Canada might look to regain some of the scientific eminence in coal technology that it once had, but has not retained.

GOLD DEPOSITS EAST OF LAKE WINNIPEG.

There has just been issued by the Government of Manitoba a bulletin on Mineral Prospects in Southeastern Manitoba. In this attractive well illustrated bulletin, J. P. De Lury gives much interesting information concerning the Rice Lake, Maskwa River and Boundary districts where many mineral deposits have been discovered during the past few years.

Of particular interest to those engaged in gold mining is the description of properties in the Rice Lake district. Gold has been found on a large number of claims and in a few cases underground development has been carried on. Some very rich ore has been taken from some of the properties and mining equipment, suitable for development work, has been installed on a number of the claims. As is frequently the case in other areas, the result from development work have not been satisfactory and no considerable amount of gold has yet been produced in this area. It is not improbable, however, that there are some workable deposits among the numerous ones discovered and further prospecting of the area may lead to the discovery of large deposits of ore of good grade. Much work must be done on many of the deposits already discovered before it will be known whether they can be worked profitably or not.

Professor De Lury's report shows that the prospectors have found many gold deposits. To determine which of these deposits are of economic value will necessitate the expenditure of considerable sums of money. To those who are willing to venture, the Manitoba Government has, in this little bulletin, presented facts which show that the Rice Lake area is worthy of attention.

A significant feature of the description of gold deposits in this area is that the area is just beyond the Western boundary of Ontario and the geological descriptions show that this is but a small part of the Pre-Cambrian area which covers so much of Northern Ontario. It is reasonable to expect that prospecting will result in the discovery of gold in many places. If the Rice Lake deposits are developed and some of them prove profitable, there will probably result more vigorous exploration of North Western Ontario.

The number of properties on which gold has been found in the Rice Lake area is large. In many cases the owners have not been able to do a great deal of development work, and the value of their discoveries is difficult to determine. Some of the deposits warrant the expenditure of large sums of money in work of a purely exploratory nature. If such work brings satisfactory results, improved transportation will be needed. Rice Lake is only 100 miles from the city of Winnipeg, however, and if the establishment of important producing gold mines so near that city depends only on transportation improvements, we may reasonably expect that this matter will be taken care of satisfactorily.

R. E. H.

WOODEN SHINGLES vs. ASBESTOS SLATES.

The Ontario Fire Prevention League suggests legislation prohibiting the use of wooden shingles, or other combustible material as a roof covering. The Secretary of the League does not see why the roof of a building should not be constructed of material as lasting and as permanent as any other part of the structure, and he points out that asbestos slates never need replacement, and that, even allowing for first high cost, the longer life of the asbestos covering makes it, in the long run, cheaper than the perishable and dangerous wooden shingle. The days when the wooden shingle will be preferable from the point of cost are rapidly passing away, and, should the use of asbestos be enlarged by a more general adoption of it for roof coverings, there is a great deal of short fibre and inferior asbestos available in Quebec Province. Asbestos is mined today primarily for the long-fibre material, and the roofing material is largely a development of a desire to use the by-product of separation of the better material.

Many Canadian towns, and this is particularly true in the Maritime Provinces, are always in danger of a clean-sweep by fire, and fires are of almost daily occurrence. The reason for this lies entirely in the combustible material of which the buildings are made, and the only hope of fair freedom from disastrous fire in many of these towns is that the "clean-sweep" which always comes sooner or later shall be followed by restricted areas from which all combustible buildings are barred.

Canada is rich in building materials. Clays for brick are numerous and good, cement rock is widespread in occurrence, building stones — especially in the East — are of the finest and most permanent character. Gypsum we have in endless tonnages. Our occurrences of commercially usable asbestos have by no means been fully employed, and there is asbestos of good quality in Newfoundland also.

The use of the wooden erection is not today either necessary or desirable in any urban community in the settled portions of Canada, and mining companies at least should carefully consider the substituting the approved structural materials that we have in such

abundance for the temporary and ever-dangerous wooden building. Some remarkable examples of saving in insurance premiums on mine plant could be quoted that have resulted from substitution of fireproof erections for wooden ones. Some not less remarkable examples of disastrous loss and consequential damages resulting from covering expensive mine machinery with a wooden erection could be given.

It should be remembered that the most adequate insurance can never fully replace a legitimate fire-loss, and, in the case of mining companies at least, the consequential damages are usually heavy, and uninsurable. The best fire insurance premium is a fireproof structure.

OUR EMPIRE, "CONSIDERED AS A UNIT."

A review of Major Edwin C. Eckel's recent book on "Coal, Iron & War" appears elsewhere in this issue.

As a fair-minded appraisal of the position of nations as influenced by their possession of minerals, and especially of those dominant materials coal and iron, the book has much interest, particularly as representing the viewpoint of an informed citizen of the States in regard to the British Empire.

Mr. Eckel points out that the industrial revolution which followed the development of steam power was first witnessed in Great Britain, and that from 1760 to 1810 that country rose to an industrial supremacy that was unquestioned and unapproached by the rest of the World. The industrial revolution did not reach the United States until forty years later, namely from 1823 to 1857. In Germany, the industrial growth commenced after the war of 1870, and was largely based on the coal and iron obtained by robbery under arms. At the beginning of the Nineteenth Century Britain led in production of coal and iron. In the meantime Germany passed Great Britain in production of iron, and the United States has since assumed a position of permanent supremacy in the output of both coal and iron.

Under these conditions, and in view of the lessened man-power of Great Britain which is a result of the war, it is worthy of note that a competent observer should still believe that Great Britain "either as a competitor or as an ally, is by all odds the most important single factor in American life," and further that the British Empire "is still the most important trade factor in the World."

"There seems to be reason," writes Major Eckel, "however, to expect considerable change in the relative "importance of its separate parts," and he further remarks, "Considered as a unit, the trading and "manufacturing position of the British Empire has "gained somewhat, rather than lost, through the occurrences of the past five years."

That the Empire is justified in considering itself as a unit the occurrences of the past five years have put beyond doubt. The family reunion, which not less than the breaking up of families, was one of the phenomena of the war to the British peoples; the inter-marriage, the travel, the widened vision, the freemasonry of experience and like endurance that links together these of both sexes who wore the British uniforms for a common purpose in the furthest flung battlefield that the world has yet seen; all these things have occasioned a revolution of thought among our peoples from which future historians may well date the beginnings of a new nationalism that shall have consequences fully as momentous as those of the Industrial Revolution, if we are able properly to appreciate the nature of the considerable changes in the relative importance of the separate parts of the Empire that are impending.

If, as Mr. Eckel states, the balance of world-power has been repeatedly changed through the concentration of industrialism around the centres of coal and iron deposition, a little consideration of the extent and location of these materials in Canada will convince us that a brilliant page of History is about to be unrolled in this Dominion, which is the eldest and most opulent daughter of the Empire, and stands where the United States stood in the early years of the Nineteenth Century.

H. FOSTER BAIN.

Newly Appointed Director of the United States Bureau of Mines.

Recent Developments in the Microscopic Study of Coal

By REINHARDT THIESSEN.*

(Paper given before the Coal Mining Institute of America, Pittsburgh, December 9th, 1920.)

Résumé of the Knowledge of the Nature of Coal until the Present Century.

Almost from the beginning of written history coal appears to have been known and described, and in some instances, records indicate its use by the ancients. Aristotle and Nicander wrote about it and Theophrastus (372-287 B.C.) described it at some length and said that blacksmiths made use of it. It was then believed to be an inorganic substance and that its origin was similar to that of rocks and stone in general. Its weight, hardness, and other characteristics similar to those of stones were mainly responsible for this belief.

Later Claudius Galen (A.D. 130-200) advanced the hypothesis that coal was composed of earthy matters such as clay, shale, and other clayey rocks impregnated with pitch or bitumen. Lakes of pitch and springs of asphalt and petroleum had been known a long time. They occurred in the vicinity of the Dead Sea and must have been known to Galen. Galen, it should be noted, advanced the dual theory as well as the impregnation theory of coal, both of which were to influence the idea of the nature of coal even to the present day.

In England coal was discovered and used as far back as the ninth century, and is said to have been brought into common use during the reign of Charles I. (1625-1649). The English adhered to the idea of the inorganic origin for some time. This theory was supported by Georgius Agricolo 1544, and Francesco Stelluti, 1637, and later by R. Kirvan, 1799, all noted scientists of their day.

In most coals there is so much evidence of plant structure, even when observed with the naked eye, that plants soon become associated with the origin of coal. Valerius Cordus, 1544, and Balthasar Klein, 1592, appear to be the first to have associated wood with the origin of coal. Later the opinion of the chemists became prevalent that coal was chiefly composed of carbon or charcoal and bitumen. The bitumen was generally held to be of inorganic origin while the carbon or charcoal on account of its evident resemblance to wood was held to be derived from plants. Others held that woody substances somehow buried in the earth or deposited at the bottom of the sea had become impregnated with mineral bitumen.

There was at that time no knowledge of the Earth's history, no knowledge of the time relationships of the

*Research Chemist, U.S. Bureau of Mines.

A BLOCK OF ILLINOIS COAL.

The dark bands (an) represent the bright coal or larger anthraxylon components; the grey striated layers (d) between the anthraxylon bands represent the dull coal. The white lines vertically to the banding represent thin plates of quartz filling narrow vertical crevices in the coal. Some of these plates are seen exposed on their broad side. Natural size.

different strata of rocks, and until this was known the position of the coal strata far below other rocks was hard to account for. Such ideas as advanced by Buffon (1744) offered a plausible solution and are therefore not surprising. He believed that during solidification of the earth's crust caverns and bubbles remained, that the surface was left uneven and full of hollows. Vegetation then appeared in great luxuriance, which after death and decay covered the earth with a slimy mass, and was then carried into the coverns and hollows, where we now find it as coal.

Scheuchzer, a Swiss, in a book on natural history, written in 1718, advanced the first plausible explanation that coal was formed from deposits of woody matter. This woody deposit was thought to have been left by the Noachian Flood. For many years after, the Noachian Flood was held as the cause of the accumulation of plant matter, giving rise to coal beds, in spite of other explanations to the contrary, based upon careful observations and correct interpretations. It was probably dangerous, however, to argue against anything involving the Flood at that time. About this time, coal was being discovered and first mined in the eastern United States; in the Richmond Basin (1760), at Pittsburgh (1763), Wyoming and Lackawana (1768), and Pottsville (1790).*

Peat-to-Coal Theory Advanced by Beroldigen.

Beroldigen, (1778 and 1792) was the first one to advance a definite and plausible explanation of the origin of coal, namely, it was analgous to that of recent peats. Beroldigen, then, is the one who advanced the "peat-to-coal" theory. His ideas at once found firm adherents and a lively controversy was set up by those who believed in the drift theory advanced by Scheuchzer. The controversy of the peat theory versus the drift theory has continued even up to the present time, although the evidence supporting the peat theory was and still is incontrovertible. The works of Beroldingen and his followers, however, were soon to be forgotten, mainly through the writings of Johann Voigt, a very prominent and influential writer. His history of coal published in 1802, in which Beroldingen is attacked in a slanderous way, and in which Voigt defends the drift theory, received recognition from the Academy of Science, of Goettingen.

Voigt found no plant imprints in coal. The cause of this he believed to be that the plant mass, after having accumulated through drift, had undergone a fermentation process in which the plant mass had lost its form and structure and had been transformed into a gelatinous mass, which later hardened under the great weight of the superincumbent rocks. Through the fermentation process an oily substance had been formed which impregnated the remaining plant residue, thus forming bituminous coal.

Voigt, although doing much to retard the correct ideas of the origin and formation of coal, advanced ideas of bituminisation, that lead in the right direction. In this he found an eager follower in Charles Hatchet. Through a fortunate opportunity in having at hand a series of coals of all grades, Hatchet was able to examine and compare coal in all it possible gradations of structure, texture, and trans

*Note:—Coal was first noted in Nova Scotia in 1672, and was mined in 1720.—Ed.

formation, and to establish a positive proof of the plant origin of coal and also to show the relationship of the resinous and perhaps the oily and gummy substances of plants to the bituminous substances in coal.

Coal Recognized as Stratified Fossil Deposit.

In 1831, more than forty years after Beroldinger, McCulloch revived the peat theory and also gave the true relationships of coal beds to the earth's strata. He showed that the different coal beds were of different ages and many of them must be of much greater age than was supposed. This, it should be noted, marks a great step in advance.

With McCulloch, during the third decade of the 19th century, the controversy concerning the origin of coal lost much of its interest and may be considered to have closed. The occurrence of plant remains in all kinds of coal was considered by many such convincing evidence of its origin in plants that all further proof was deemed superfluous. Yet it must not be thought for a moment that arguments in favor of the inorganic origin of coal were concluded.

A Wooded Peat Bog of Wisconsin.

Quite a number of men, and some of them quite prominent, within recent years have appeared in favor of the inorganic theory. Towards the middle of the 19th century the trend of investigation and thought in coal was taking three directions. As has been already noted, there were two opposing theories of the origin of coal since the earliest time, namely, the peat theory, that is the plants grew on the spot where the coal bed had been formed, and the drift theory, that the plants had been drifted or floated to the spot where the coal beds had been formed. This controversy was continued mainly by the geologist.

The Coming of the Paleobotanist.

The discussion of the origin of coal gradually merged into that of the composition of coal. The investigation in this field in turn assumed two directions, the one which chiefly engaged the interest of the fossil botanists had to do with the problem of what kind of plants entered into the formation of coal, the other had to do with the problem of what kind and nature of plant products survived to form the coals, or in other words of what is coal now composed. These two phases were carried on by diversified classes of men—geologists, chemists, paleobotanists, and even preachers were engaged in the problem with but small results.

Incomplete Chemical Knowledge Deterred Research.

The problem of the nature of coal is of the most vital importance and engages our thought at this time. With the theory of the origin of coal there was also associated the problem as to how the plant material was transformed into coal, and what the agents were that brought about this transformation. This problem mainly engaged the chemists and received a new impetus about this time by the works of De Sassure and Liebig but towards the end of the 19th century lost most of its interest for lack of proper knowledge in chemistry. This phase of the coal problem involves colloidal chemistry, which of course, until within the last few years was an unknown science and so no progress could be expected. It formed an unsurmountable barrier to further investigation in this direction at that time.

The Microscope Open News Field for Research.

Very little had, up to this time, been contributed to the knowledge of the real nature of coal. That which was known was contributed incidentally in the discussion of the origin of coal. Little could have been done in this direction for want of proper means of observation. Only with the advent of the compound microscope, which at that time was very crude and inefficient was attention turned to this method of research. The first real object in using the microscope, by the way, lay not in the study of the composition of coal, but was to prove its plant origin. This, however immediately led into the study of its composition and structure, because in order to study the origin a better knowledge of its structure was required.

British Microscopists Were Pioneers.

The first one to use the microscope in the examination of coal was Witham (1831). Witham had been accustomed to make sections of fossil wood, and to examine it with the microscope. He thus became familiar with the structure of wood, particularly that of coniferous wood. It should be remembered that but little knowledge of the structure of plants had been obtained at this time. It occurred to Witham to examine coals in a similar way. In the Bovey coal, a brown coal or lignite, he observed unmistakably the structure of coniferous wood. In the cannel coals he observed peculiar cellular structures. It was these peculiar structures that induced Hutton (1837) to continue the study. Hutton was not able to tell what these cells were but found them in all the ordinary coals investigated. He also found that the ordinary bituminous coals consisted of two classes of coals, the one a more homogenous or more crystalline portion, and the other a duller portion. The peculiar cells filled with wine colored matter occurred only in the duller portions. These bodies were observed by a number of later workers, but was left to Balfour (1854) to identify them as spores, of certain lycopodeaceous plants. Hooker, only a few years before this (1848) had examined and described a fossil cone in which the same kind of objects were found and identified as spores. The larger ones, now known to be megaspores, he called seeds and spore-cases. Some of these were later identified as megaspores by Dawson.

Huxley (1870) showed the universal presence of the spore matter and that it always forms an important constituent in coal; although it should be noted that Huxley much over estimated the proportion the spores lent to the coal mass. Other investigators who observed spores in coal were Williamson, Wethered, Bennie and Kidston and all agree with Hutton that the spores do not occur in all the layers of the coal bed but mostly in the duller portions. Wethered points out that the dull and bright laminae occur alternately and that the dull laminae contain most of the spore-matter while the bright coal contains little or none. Bennie and Kidston confirmed the relationship of these spores beyond any doubt.

Theories of Bertrand, Renault and Potonie.

Just at the time when the presence of spores and their origin was considered as settled, Bertrand and Renault (1900) came forward with new theories that, by virtue of their prominence in science, upset the whole conception of spores in coal and also the idea of the origin and formation of coals. They conceived that most of these bodies that had hitherto been called spores, were algae, and with these developed the gelosic-algal theory of the origin of coals. It became all the more serious when the theory was in part accepted by Potonie, the foremost investigator on coal at the time, with a long list of followers.

Thiessen and Jeffry Uphold Spore Theory.

Jeffry (1912) and Thiessen (1913) independently corrected this false notion of the algal and geolosic theories in proving that all the bodies called algae were the spore exines of Paleozoic plants. But the gelosic-algal theory was very fascinating and at once appealed to the geologists, as it also explained a number of phenomena that seemed as yet inexplicable and so it became very popular and spread fast. It also got into the text books where much of it is yet.

Hutton (1837) saw, besides the "peculiar cells", "unmistakably more or less of the vegetable texture in the coal he examined." Link (1836), who examined similar coals soon after, did not believe that what Hutton saw was the structure of wood. Link probably was right, and what Hutton saw were merely the cross sections of thin sheets of woody matter in coal, usually mistaken for fibres. Link according to his description saw the structure of wood in coal as well as other plant tissues. It should be remembered that the plant structures observed in coal all through the years, were not so much from thin sections of coal as from the macroscopic* appearance of the horizontal cleavages. Goeppert (1846-1852) added most to the knowledge of coal and apparently obtained all or most of his knowledge of coal through the microscopic as well as macroscopic appearance of the horizontal cleavages, and the ash method as he never speaks of thin sections. We are indebted to Goeppert for the first extensive knowledge of the kind of plants that formed the original substance of coal, but he is somewhat [illegible] error as to what tissues of the plants remained to form it. He inferred that the charcoal or "mother-of-coal" was derived mainly from the Araucaria (coniferous trees); the bulk of the true coal to be formed from Stigmaria, Sigillaria, Lepidodendra and Calamites, but that the structure of these had been so much changed, that nothing or very little of it was left; and that the discernible plant structure in the coal was derived from the bark of these trees. Fossil

*"Macroscopic", perceptible to unaided vision. Used in contradistinction to microscopic

played but a small part in coal formation. Balfour (1854) claimed that Sigillaria and Stigmaria were the most important coal-forming plants and backed his statements up with good illustrations. Queckett (1853) on the other hand believed that the Lepidodendra, Sigillaria and Stigmaria rarely, if ever, formed coal and that it was formed almost entirely of coniferous trees, that is, trees related to our pines.

Dawson's Contribution.

Dawson also spent much time in determining what kind of plant gave rise to coal and adds Poacites and Ulodendra to the list already given. The conifers he concluded are represented only by their bark. He found but very little woody or plant structure in the compact coal, the plant cells having mostly been obliterated and compressed into a homogenous mass. Mineral charcoal, he inferred, consists of fragments of bark. Huxley concluded that none of the wood was left in coal and that the bark and the spores of plants contributed to the bulk of a coal bed.

Lesquereux, probably made the most complete survey of fossil plants in relation to the kind of plants entering into the coal, that has ever been made in America, as he believed it to be impossible to get a correct idea of the nature of coal if the nature of plants contributing to coal was not known.

With Dawson, Lesquereux and Guembel, a new era in the idea of the nature of coal was inaugurated. They showed that all parts and products of all the plants, as far as known, contributed to coal; all possible plant structures and tissues such as woody tissues and fibers, bark, cellular tissue, cuticles, spores, pollen-grains, resinous bodies and other minor objects could be recognized; and that in the coals all is bound together by a substance which Guembel called the "carbohumin," into a more or less homogenous-appearing mass. Relatively little plant structure had been preserved.

The problem as to what kind of plants gave rise to the coal beds has been supplemented by a number of investigators, the foremost of whom in this country is White. This subject has been worked up more from the rocks accompanying coal beds than from the coal itself and has assumed vast proportions. It is of relatively little importance in the present consideration.

Alternation of Dull and Bright Layers in Coal.

When Hutton was looking for spores in coal, he also discovered that coal was composed of different kinds of layers and that these could be classified into two kinds, the one a homogeneous "crystalline" containing no spores, or only a few; and the other a duller, less homogeneous layer which contained most of the spores in coal. Upon this basis, he proposed to classify coals into slate-coals, coking-coals and cannel-coals. The different layers and varieties of coals were ascribed to the original differences in the plants from which they were derived.

Dawson, 35 years later, came to similar conclusions, but he distinguished two main classes, mineral charcoal and compact coal. The compact coal consisted of bright conchoidal pitch-coal and duller slate-coal with a horizontal fracture containing much earthy matter arranged in thin interrupted laminae. The bright coal, he concluded, was mainly derived from bark, and the dull coarse coal to consist of numerous sublaminae of disintegrated vegetable matter mixed with mud. The mineral charcoal was supposed to be derived from the woody matter impregnated with bitumen.

Huxley also distinguished two classes: mineral charcoal and coal proper. The charcoal was thought to be composed of stems and leaves reduced mostly to carbon. The compact coal, he believed to be mainly composed of spore matter and some bark. The woody parts of tree, he concluded, has largely decomposed and disappeared.

Wethered (1885) calls the "bright coal" a "hydro-carbon," and describes it as a structureless, dark-brown mass, forming a very important constituent of coal, but he does not attempt to account for its origin. The dull coal contained a large number of micro-spores and megaspores.

Muck (1888) discusses the layering of coals at some length and introduces a new term, pseudo-cannel-coals, applied to the dull coal associated with the fatty coals and differing from the dull coals which are associated with gas coals, in respect to its origin. The difference between cannel coals and pseudo-cannel coals is that the latter contain no algae-like bodies. To determine the difference in origin in these coals, he regarded as a very difficult matter.

Potonie divides coals into three classes: humus coals, derived for the most part from land plants; cannel coals, derived for the most part from aquatic plants; and spore coals derived largely from the more resistant plant substances like spores, pollens and resins. The humus coals have assumed a homogenous, pitch-like consistency and are of a lustrous appearance and so are called "bright" coals. The dull coals have assumed a granular consistency and a dull appearance and so are called "dull" or "mat" coals. Most all the ordinary bituminous coals are mixtures of humus and cannel coals, arranged in more or less alternate layers and are called "banded" coals. Since the typical humus coals were supposed to be formed under ordinary conditions, such as we may observe in the growth of the land plants and the cannel coals under very wet conditions; in order to account for the alternations of the two kinds of coal in the same bed, Potonie assumed that during the formation of the ordinary striped coals, there was a sort of struggle going on between very wet and dry conditions, a sort of oscillation from one to the other in relatively short periods of time.

These in brief are the peaks over the road that leads up to our knowledge of the nature of coal as it stood at the beginning of the 20th century. Volumes have been written during this time of almost two centuries. Yet considering the number of investigators engaged on the problems involved but little progress has been made. If any one should attempt to get an adequate understanding of the nature of coal through a study of the literature compiled on it during this time he would be ill advised, because of the numerous contradictions, conclusions drawn from wrong premises, wrong interpretations and hasty assumptions. Progress was slow on account of the difficulty of the subject, and wrong methods of attack; further in many phases, there was a lack of the knowledge of the underlying principles. As is often the case today, investigators occasionally blindly followed a leader into realms that led nowhere. Writers of text books copied the conclusions of prominent men irrespective of right

or wrong, and when a statement has once gotten into a textbook of authority it is hard to eradicate it. It is so even today and was more difficult in the years gone by. Scientists in other fields were content with what the text books had to say.

Investigation on coal was primarily the work of the man in quest of knowledge for the sake of knowledge itself to satisfy his hunger to know why and how, a quest for that which exceeds gold in value.

The industrial world did not bother itself much with the nature of coal. Fuel was plenteous, and nobody worried about its nature as long as they could shovel it into the furnaces, even if it did smoke too much to suit kings, queens and squires. At one time the burning of coal was stopped in London, when Parliament was in session, under penalty of death, and, as the Chronicles relate one man was hanged for burning coal. But that was long ago. We would all be hanged in Pittsburgh today under a reign of an Edward I.

(To be Continued.)

MINING IN NORTHERN MANITOBA.

By R. H. HAGUE, Winnipeg.

There is comparatively little activity in connection with mining in Manitoba at present. In The Pas district development work on the Flin Flon has been suspended, and the miners discharged. A staff of 25 will be kept on, however, to keep the shafts pumped and for work of a general character. It is generally understood that the New York interests who have the property under option will close the deal in April next, and pay over the purchase money to the owners.

The development work was done by Messrs. Longyear Co., of Minneapolis. The miners were first employed last February, and some handsinking was done while waiting for machinery, which was set in motion late in the Spring. Two shafts were sunk, one at the north end and the other at the south end of the outcrop. A depth of 200 feet was reached on No. 1 shaft, at which level some cross cutting was done, 24 feet east and 294 feet west, and a drift to the south for 270 feet, where a second cross-cut was made for a total of 245 feet. No. 2 shaft was sunk to a depth of 300 feet, and encountered solid sulphides at 40 feet. At the 100 foot level a small amount of stoping was done, and a total of 160 feet of cross-cutting east and west. At 300 feet a cross-cut of 111 feet to the east and 3 feet to the west was done.

In addition to the tonnage of between 16 and 20 million tons of ore ascertained in September, new bodies have been encountered that were not disclosed by diamond drilling, but no estimate of the additional tonnage has been given by the Syndicate.

A preliminary survey of the proposed railway route from The Pas to Flin Flon is being conducted by the Manitoba Provincial Government. General satisfaction is expressed at the suggested route, which will lie largely in a greenstone area where many promising prospects exist, and will be handy to Copper Lake, where some good gold propositions have been staked.

At Herb Lake shaft sinking continues on the Rex and Bingo properties, and it is reported that very satisfactory results are being obtained.

A certain amount of work is being done on various properties in the Rice Lake district, and the question of putting a mill on the Pendennis group is being discussed. Several new discoveries, which promise to prove of importance, have been made in the Lac du Bonnet region.

The Copper Lode Exploration Company have opened offices in Winnipeg and anticipate diamond drilling some of their properties in The Pas mineral belt shortly. The directors of this company are principally well-known Saskatoon men. The managing director, S. S. Reynolds, was the original discoverer of the Mandy Mine, in Northern Manitoba, from which over $2,000,000 worth of high-grade ore has been taken. He is at present in Winnipeg. The objects of this Company are to take over properties from prospectors on the interest basis and develop and diamond drill them to an extent where an engineer from a purchasing company can inspect and report. The principal difficulties which engineers have experienced in this district in the past have been on account of the lack of development work done on properties which they have been sent to inspect, which rendered it almost impossible to pass a definite opinion. Such companies as the Copper Lode Exploration Company should do a great deal to improve this situation. This company already holds 650 acres of promising mining country in The Pas district and has options on other propositions, including the Rosen property, situated four miles east of the Mandy Mine, and comprising five claims, which has been described as one of the most important discoveries made in Northern Manitoba. The outcrop contains considerable cobalt bloom, which has not been noticed elsewhere in Canada since the silver mines of Cobalt, Ontario, were discovered. It is reasonable to expect the presence of silver in this ore body, occurring as it does in pre-Cambrian rocks with characteristics similar to those of Northern Ontario. This is a very recent discovery and has not yet been systematically sampled. Some smaltite can be seen in surface specimens. From another vein said to have been traced 1,500 feet with an average width of 150 feet, copper samples assayed four per cent, and a third vein, which has been traced for 800 feet, with an average width of 20 feet, is a promising gold prospect, and apart from the gold values in the quartz is valuable as a flux in the treatment of the copper contained in the other veins. It is the intention of the Company to devote considerable attention and expenditure to this property.

A GOOD SUGGESTION.

The Halifax Herald suggests the revival of the old University of Halifax, to prescribe courses, give examinations to, and confer degrees upon, such persons as may be able to qualify themselves, by private study, for University recognition. It cites the University of London as the model to be followed in this connection. The suggestion is a sound one. Such a university would be certain to broaden the influence of higher education in the Maritime Provinces. As it is, there is too much traditionalism and exclusiveness in our colleges. University extension courses should be developed on a systematic scale by all the degree-conferring institutions in this province, working in co-operation with one another. If such courses were inaugurated, and a University examining board established along the lines followed by the University of London, a great renaissance of educational effort would result. If some such plan should be worked out by the Universities, campaigns for endowment funds would have more meaning for the general public, and would elicit more cordial and generous support.—"Sydney Post."

Northern Ontario Letter

THE SILVER MINES.

The Cobalt District.

Assurance from Senator Key Pittman, of the United States, that there is no danger of the Pittman Act nor the purchase clause of the Act being repealed is among the most satisfactory news reaching the operators of silver-producing mines. The statement issued by Senator Pittman is presented elsewhere in this issue of the Journal, and indicates that the author of the Act is entirely confident of its full operation. This means that the United States Government will continue to purchase the annual output of the silver mines of that country for a period of at least several years, and is interpreted in other countries as likely to so influence the market that world prices for silver will rule comparatively high during the period of its operation.

The development of ore on the Bailey Silver Mines continues to be favorable. An official of the company informs your Correspondent that good milling values occur over a width of three or four feet, and the deposition of the metal is uniform. This in itself is of considerable importance. In addition, however, high-grade patches of ore are encountered at intervals of about each second round of shots, and this is adding considerably to the importance of the deposit. About 600 feet of almost virgin territory lies ahead and the geological structure is favorable.

On the University property of the La Rose, the high grade vein opened up in the closing days of 1920, some very rich ore is being found. This vein occurs in close proximity to the boundary of the Bailey. Indeed, it is learned that the location and strike of the new vein on the Bailey as well as that on the University holds out promise of both of these properties being in line for general favorable results along one and the same zone of mineralization.

The distribution of profits realized up to 1917 in addition to the dividends and bonuses paid up to that time on the Coniagas Mines, came as a quite general surprise in mining circles. The disbursement, which amounts to $600,000, is equal to 15 p.c. on the company's issued shares. The nature of the disbursement is unique in the history of the mining companies operating in this field. It is understood to be due to the fact that the profits realized up to that time were not subject to income tax, which permits this large distribution to be made without being taxed.

In recent years the Coniagas has made regular distribution of dividends at the rate of 2½ per cent quarterly, and during 1920 paid a bonus of 2½ per cent, making a total of 10 per cent or $500,000 for the year, added to which is the special disbursement of accrued profits of $600,000.

The Coniagas paid its first dividend of 2 per cent. on May 1st, 1907. Since that time a total of $10,740,000 has been paid, inclusive of the present distribution of accrued profits up to 1917.

Following is a summary:—

	P.C.	Amount
Dividends	197½	$ 7,900,000
Bonuses	56	2,240,000
Accrued to 1917	15	600,000
Totals	268½	$10,740,000

The Coniagas is the second largest dividend paying silver mine in Canada, being led only by the Nipissing, which has over $23,000,000 in dividends to its credit. The record is exceeded by only one dividend-paying gold mine in Canada, that being the Hollinger Consolidated with a little over $13,500,000 to its credit.

Diamond drilling on the Crown Reserve mine has been discontinued. The drill reached a depth of about 1,500 feet without revealing the presence of another sill of diabase formation.

The Kerr Lake has taken an option on the two Hargraves claims for which negotiations have been pending for the past few weeks. It is planned to extend drifts onto the Hargraves from the main workings of the Kerr Lake. These drifts will follow the No. 3 vein, one being driven from the 375-ft. level and one from the 425-ft. level. Part of the plan consists of exploring both above and below the contact. During the course of this work, developments in other parts of the Kerr Lake mine will be narrowed down somewhat. It is understood the option on the Hargraves is for about three months, and the price is adequate to pay off the debts which the Hargraves owes, provided the Kerr Lake meets with the encouragement necessary to warrant exercising the option. On January 20th, Harry Kee, manager of the Kerr Lake, left for New York, and will visit the Kerr Lake's silver property in Utah during the course of about a month or six week's absence from Cobalt.

South Lorrain.

Mining interests in the South Lorrain district are preparing to lend their support to a general movement in the district of Temiskaming to induce the Ontario Government to build a trunk road from North Bay to Cochrane. This proposed road would pass through South Lorrain and would provide transportation for the various promising mining properties in that area. Truck haulage would greatly minimize the difficulties which confront operators at present in that field.

The coming summer promises to see the Keeley Silver Mines producing at a moderate rate, while the Haileybury Frontier is expected to be making regular shipments of cobalt-bearing ore.

Work in Lorrain during the coming months will depend a great deal upon the quotations for silver, as well as the demand for cobalt metallics, a high percentage of which occurs in various promising veins, throughout the district.

Ore and Bullion Shipments.

During the week ended January 21st, three Cobalt companies shipped an aggregate of three cars containing 207,990 pounds of ore, this being an increase of one car above the former week.

Following is a summary:—

Shipper	Cars	Pounds
La Rose	1	87,990
Beaver Con.	1	60,000
Dominion Reduction	1	60,000
Totals	3	207,990

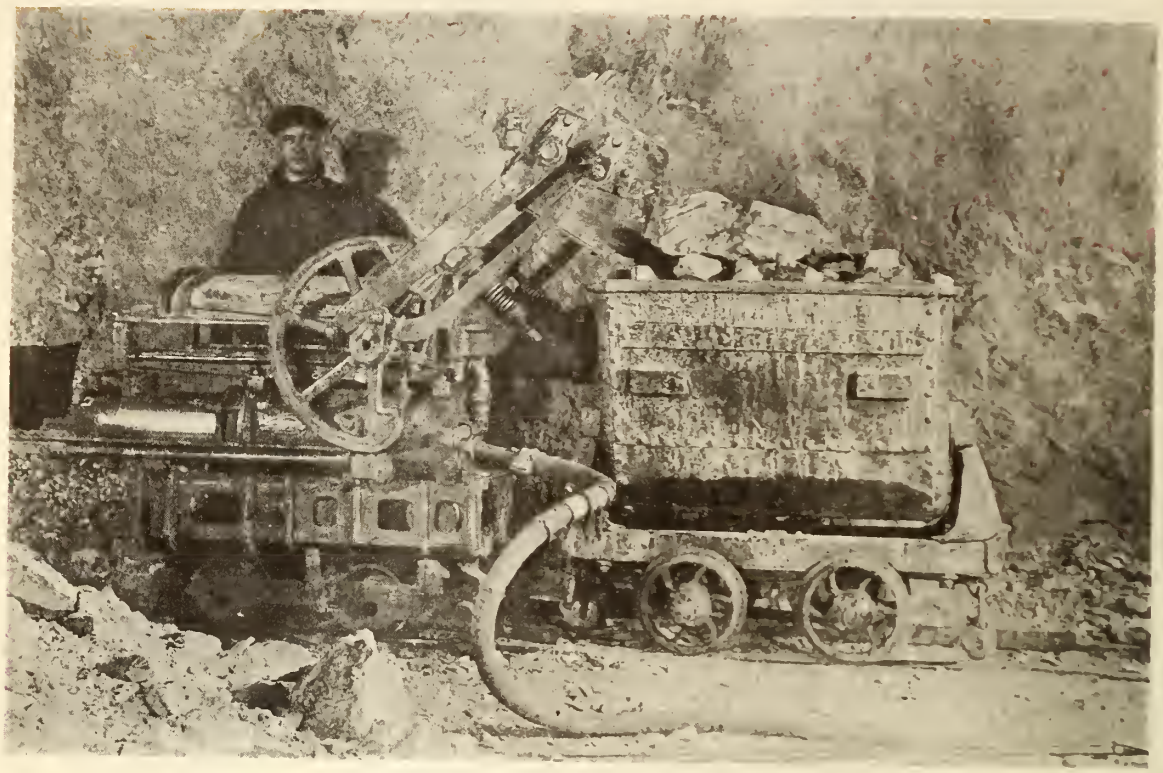
During the corresponding period, no bullion shipments were reported.

THE GOLD MINES

The Porcupine District

Mild weather has prevailed into the third week of January, and the power situation is less severe than would otherwise be the case. However, work is seriously restricted, and the operating companies are meeting the situation as best they can pending the arrival of Spring and a normal power supply.

Developments of importance are stated to have been



A Mechanical Shoveller—An Endeavor to Cut Shovelling Costs.

Drill Set up in Stope-Hollinger Mines.

Some views taken in the Hollinger Mine (Photographs are reproduced, by kind permission of Mr. A. A. Cole, from the Report of the Mining Engineer of the Temiskaming & Northern Railway Commission.)

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Handling Ore Cars to Pocket by Electric Locomotive at the 550-ft. Level, Hollinger Mine.

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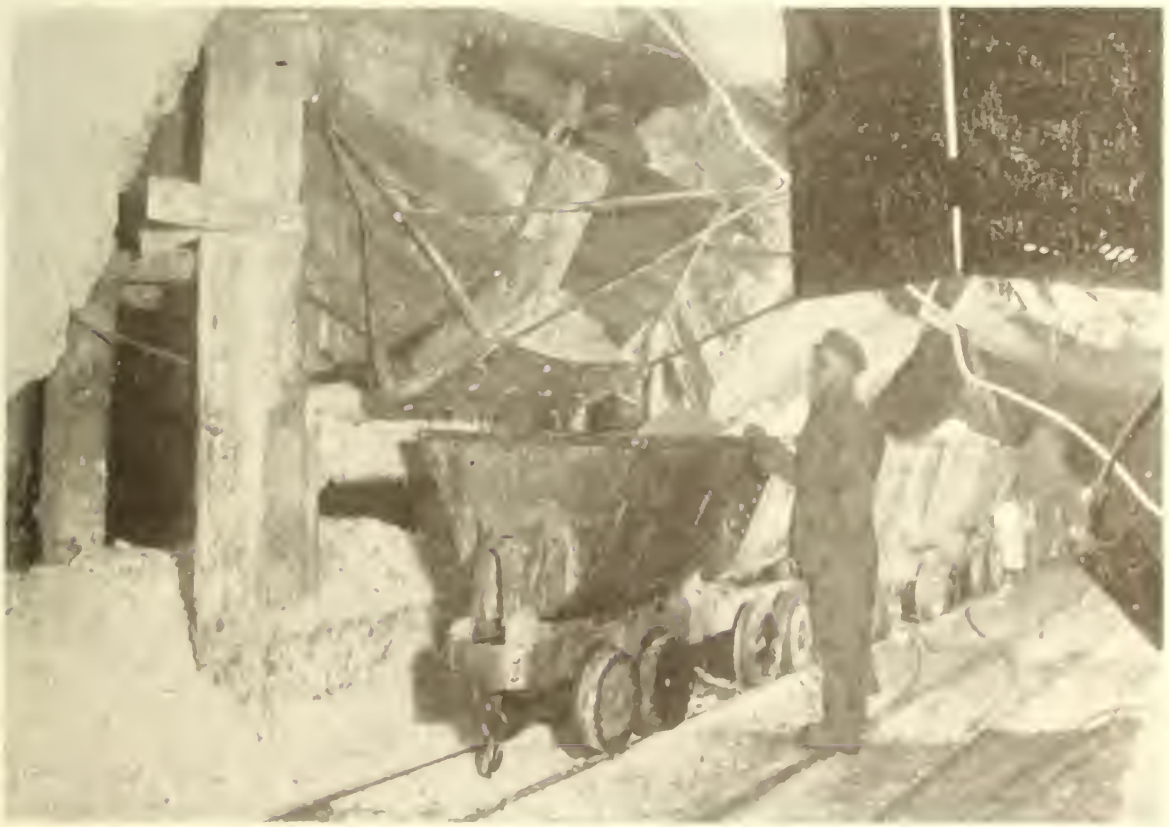


Loading Ore into Cars From a Hope Ore chute, Hollinger Mine.

made at a depth of 1,050 feet on the Dome Mines. Sections of the new orebody are said to contain approximately $20 per ton in gold. The importance of this find may be estimated to some extent by keeping in mind the fact that the average gold content of the ore developed in the upper levels does not exceed six dollars a ton. Officials of the Dome are reticent with regard to the new developments, although the advice comes from good authority. Power shortage has reduced the tonnage going to the mill but mining men familiar with the situation are looking to the future in estimating the earning power of the Dome. It is believed the Dome may be able to show a net profit of about three dollars on each ton of ore treated. Provided this proves to be correct, the monthly net profit would be upwards of $120,000 when operating at full capacity. At this rate, the annual profit would reach $1,500,000, and would exceed 31 per cent a year on the companies 476,000 issued shares of a total par value of $4,760,000.

Unofficial reports are current which would indicate the likelihood of arrangements being made to re-open the Schumacher mine in the early spring. Work formerly carried to a depth of 700 feet may be extended to the 1000-ft. level as part of the program following the re-opening. The property is equipped with a mill which is adequate to treat over 200 tons of ore daily.

Kirkland Lake District.

Capt. Jorgensen, of the Aladdin-Cobalt company, is understood to have sailed from Liverpool on January 15th for the purpose of visiting the company's Cobalt property, as well as to attend the annual meeting of the Tough-Oakes Gold Mines which is due to be held at an early date.

No material change is anticipated in regard to the output of gold from the Kirkland Lake district during the balance of the winter. Power supply is now said to be adequate to meet demands, although not sufficient to permit the Wright-Hargraves to utilize its mill. This big new plant, however, is now completed and can be turned up at any time required. For the time being, a limited amount of underground work is being done, and this branch of work will be speeded up in the coming months so as to be prepared to meet the full demands of the mill.

A petition is bring circulated in the Swastika district with a view to encouraging the construction of a railway from the C. N. R. Railway, through West Shining Tree, Gowganda and Fort Matachewan to Swastika on the mainline of the T. & N. O. Ry. The petition is being signed by a great many in the districts mentioned. Branches of the T. & N. O. Ry. already built to Elk Lake and to Timmins make either of these points attractive as a starting point for such a project, and would reduce the distance very considerably as compared with the Swastika line. However, in view of the Ontario Government having recently refused to consider the proposal to build such a line from Timmins to the C. N. R. because it would injure business on the T. & N. O. Ry. it is not believed the present petition will succeed.

Fort Matachewan.

Scarcely a blow is being struck in the Fort Matachewan gold area. This is due chiefly to adverse economic conditions, but is due in part to unsatisfactory transportation. The Matachewan Gold Mines, which is the one outstanding property to receive a reasonable amount of exploration and development work, is conceded to be developed to a point where it may be regarded as likely to prove to be a commercial proposition of limited size. This is looked upon as an excellent beginning, and holds out hope of the size of the enterprise increasing with additional work. It may be seen, therefore that a railway which would tap this district would have its advantages, although the present time may be a little premature.

SENATOR PITTMAN'S DEFENSE OF SILVER PURCHASE ACT.

The following statement, made by Senator Key Pittman, explaining the reasons that led the United States to enact the Silver Purchase Act, and the unlikelihood of its early repeal, is of general interest to Canadian producers of silver, who are fully cognisant of the stabilizing nature of the Pittman Act.

"Neither the bill nor the puchasing clause will be repealed, because, in the first place, it would be morally wrong, and, in the second place, there are sufficient western Senators to defeat any such attempt. In fact, any such attempt would be such a violation of the moral obligations of the Government to the silver producing section of the country that the Senators from such sections would be justified in conducting an open filibuster. No amendment and no bill can pass the United States Senate in the face of such a serious and intense filibuster.

"But, as to the moral grounds: In April, 1917, Great Britain had to have a large quantity of silver to use in the redemption of her silver notes in India. It was frankly admitted by the British representatives that unless this silver was supplied for redemption there would probably be a revolution in India. A revolution, in India at that time might have changed the whole result of the war in Europe, and undoubtedly would have at least long delayed our victory.

"There was only one place to obtain the silver and that was from the coined silver dollars in the Treasury of the United States, which were held there as security for the security of silver certificates issued against them. The silver could not be used except by authority of Congress. The Administration realized that the dumping of three or four hundred millions of dollars worth of silver on the market of the world would have a tendency to long depress the market price of silver. They were aware that western Senators and western Representatives would oppose, and justly oppose, the dumping of this silver on the market unless at the same time there was a provision made to protect the American producer against loss resulting therefrom.

"The Government, therefore, entered into a frank discussion of the matter with the Senators and Representatives from the silver producing states. It was evident that no bill could be passed without their approval. These Senators and Representatives were patriotic, and were impressed by the necessities of the case. They only insisted upon the silver being sold to Great Britain at a fair price, and that with the money obtained from Great Britain an equal amount of silver be purchased from American producers with which the silver dollars would be replaced.

"It was finally agreed that our Government should sell not to exceed three hundred and fifty millions of the silver dollars at a dollar an ounce net to the Government, and that it should purchase American produced silver when tendered to it at a dollar an ounce until an amount of silver had so been produced equal to that which was sold.

"The Government neither made nor lost anything in the transaction. The government is not paying any bonus to silver producers. If any bonus is being paid, it is being paid by Great Britain, because our Government is purchasing the American silver at a dollar an ounce with British money.

"The whole matter was the result of the solemn agreement between the executives of the Government and the Congress of the United States, and the Act received the unanimous vote of the Committee on Banking and Currency of the Senate and the Committee of Banking and Currency of the House of Representatives, and was passed by both bodies with hardly a dissenting voice.

"It matters not if the Pittman Act does guarantee that the price of silver does not fall below a dollar an ounce for many years. This protection was well earned and the country does not suffer by reason of it. Any further talk of the repeal of the Pittman Act or the purchase clause in it must be either the result of ignorance or a premeditated intention to depress the price of silver properties and securities.

"England's effort to supply base silver coin is in every respect of similar effect to the circulation of fiat paper money. By reason of the small amount of it, it may continue to circulate in Great Britain at par. Its value in foreign countries will be depreciated to the extent of its lack of purchasing power in the United States."

INGOT METALS QUOTATIONS.

Being fair average prices for ingot metals (in less than car load lots) at points mentioned:

Montreal.

	Cents per pound. Jan. 19th.	Jan. 26th
Copper, Electro	19	18
Copper castings	18 3/4	17 3/4
Tin	40	38
Lead	6 1/2	6 3/4
Zinc	7 3/4	7 1/2
Aluminum	34	34
Antimony	7 3/4	7 3/4

Toronto.

	January 27th
Copper, electro	18
Copper, casting	17 3/4
Tin	46
Lead	7
Zinc	8
Aluminum	32
Antimony	8

(Unchanged from previous week.)

Vancouver.

	January 18th
Copper, electro	20 1/2
Copper, castings	20
Tin	45
Lead	6 3/4
Zinc	8
Aluminum	35
Antimony	7 3/4

TORONTO MINING STOCK QUOTATIONS.

Quotations for Active Stocks on Standard Stock Exchange for week ending 22nd February, 1921.

Silver.	High.	Low.	Last.
Adanac Silver Mines, Ltd	2 1/8	2	2
Bailey	3 3/4	3 1/4	3 1/4
Beaver Consolidated	38	32	35
Coniagas*	2.00	1.55	1.80
Crown Reserve	18	16	17
Gifford	1 1/8	1 1/8	1 1/8
Hargraves	2	2	2
La Rose	34 1/2	32	33
McKin.-Dar.-Savage	31 1/2	28	29 1/2
Mining Corp. of Can.	1.10	1.07	1.07
Nipissing	9.00	8.76	8.95
Peterson Lake	11 1/2	11 1/4	11 1/2
Temiskaming	25	24	24 1/2
Trethewey	20 1/2	18 1/2	18 1/2
Gold.			
Apex	2	2	2
Atlas	16	15 1/2	15
Dome Lake	3 1/8	2 3/4	2 3/4
Dome Mines	13.90	13.25	13.40
Gold Reef	3 1/2	3 3/8	3 3/8
Hollinger Cons.	6.35	6.19	6.35
Hinton Kirkl'd G.M.	9	8 1/2	9
Keora	24 1/2	20	23
Kirkland Lake	48	46	47
Lake Shore M. Ltd	1.24	1.15	1.22
McIntyre	1.92	1.82	1.89
Moneta	10 1/2	10 1/2	10 1/2
Newray Mines, Ltd	5 1/2	5 1/4	5 1/2
Porcupine Crown	23	20 1/2	22
Porcupine Imperial	1/2	1/2	1/2
Porcupine V.N.T.	22	21	21 1/2
Preston East Dome	2 1/2	2 3/8	2 1/2
Schumacher	26	21	24
Teck-Hughes	12	10	10
Thompson Krist	7 1/2	7 1/4	7 1/2
West Dome	9 1/2	8 3/4	9 3/8
West Tree Mines, Ltd	6	5	5
Oils.			
Ajax Oil	22	21	22
Petrol Oil, The	37	34	37
Rockwood Oil, Gas	2 3/4	2 3/4	2 3/4
Vacuum G.	15	12	12 1/2

*Coniagas. Sold Ex Dividend 15% Jan 18th, 1921

TORONTO COAL PRICES.

Toronto, Jan. 27—Railway movement of coal is good, a record having been established during the past two weeks by coal coming through from Pennsylvania in from five to seven days. Enquiries are coming in a little better and there has been some slight improvement in trade although business is still rather dull. Smokeless coal is quoted at from $8.25 to $9.00; slack, $6.25 to $7.50; lump, from $8.00 to $8.50; anthracite $9.50 to $11.00.

TORONTO NOTES

A group of Canadian and American men interested in mining is seeking incorporation at the Ontario Parliament Buildings under the name of Feconis, Limited. They are to engage in the building up of a mining, smelting and refining industry in the Sudbury district. Wide powers are asked for including the right to ex-

propriate property or easements for the construction of a tramway line to connect its property with the C. P. R. and the C. N. R. The directors are all residents of Erie, Penn., except R. J. Copeland of Toronto and J. A. McEvoy, barrister, of Toronto.

Decisions of importance affecting the future of Goldfields, Limited, were reached at a meeting of shareholders held in Toronto on Jan. 22. The plan of the sale of the assets of the company to the recently formed Canadian Associated Goldfields, Limited, put forward by the directors, was approved. Mr. A. C. McMaster, on behalf of the company, gave the shareholders his undertaking that the transfer would not be put into effect until Mr. J. Y. Murdoch had assured himself that the auditor's statement, as presented, was correct, and also that the transfer of the assets of Goldfields, Limited, under the agreement would be put through simultaneously with the transfer of the assets of the Associated Goldfields Mining Co., Ltd., the exchange of shares having been already effected individually by shareholders. The annual meeting will not be held until Feb. 23rd.

British Columbia Letter

The Metal Mines.

Atlin, B. C.: — The placers of the Atlin District, northern British Columbia, have not been bringing the returns nor furnishing the employment that they did in past years and residents of the mining town and of adjacent country are looking forward to the development of lode-mining properties to assure a return of the camp's prosperity. The property upon which they chiefly depend is the Engineer. When its title is established by the Courts it is asserted that the Guggenheims will be prepared to take over this mine for a substantial consideration and operate it. Atlin people, therefore, want to see the litigation brought to an issue without delay. The purchase of the Engineer by a concern having adequate financial resources would mean, not only the exploitation of that property, but the acquirement and development of a considerable adjacent area. There are besides quite a number of promising propositions in the Atlin District to which attention would be directed should the Engineer become active.

Prince Rupert, B. C.: — H. S. Munroe, general manager of the Granby Consolidated Mining, Smelting & Power Co., has denied that there is any truth in the report that the Consolidated Mining, Smelting & Power Co. has entered into negotiations for the purchase of the Anyox Mines and Smelter Plant. Before leaving for New York recently he said that, while the copper market was unsatisfactory, the Anyox plant was being maintained and would continue to operate at present capacity, producing about 2,750,000 pounds of copper a month and employing 1,100 men. The recently adopted method of transporting blister copper to the New Jersey refinery by water through the Panama Canal was effecting a saving of half a cent a pound and the period taken for delivery was about the same as by rail between 40 and 45 days from the City of Vancouver.

The Drum Lummon Mine will be re-opened on April 1st next according to Glenville A. Collins, the new Manager. Plans are being made for the separate treatment of the gold values and a new plant is to be installed for the handling of the high-grade copper. There is a water-fall situated close to the property which it is proposed to harness, thus equipping the mine plant with electrical energy.

Alice Arm.—Mining men interested in prospects on the Illiance River expect some of their holdings to develop into high-class producing mines. It is said that the Bellevue Group is showing up well, there having been uncovered a well-defined vein, samples from which have assayed 23.05 ounces of silver to the ton, .07 ounces gold; and from 3.4 to 5.4 lead. Work is proceeding this Winter and the syndicate in control proposes installing a concentrator next season. The operating company is known as the Alice Arm Consolidated Holdings Ltd.

Nelson, B. C.—At a recent meeting of the Nelson (B.C.) Board of Trade a resolution was adopted urging the Dominion Government to purchase silver at 80 cents and to institute the coining of silver dollars. This will be placed before the annual meeting of the Associated Boards of Trade of Eastern British Columbia for endorsement. The resolution is as follows:

"Whereas the present unemployment situation amounts in effect to an industrial crisis and it is desirable and behooves every good and loyal citizen to avert such crisis, and as owing to the high cost of production, many mines have been forced to suspend operations, since it is unprofitable to mine for silver at the present variable prices of the metal, there is of necessity much unemployment and suffering throughout the country. The establishment of the silver industry would ameliorate this state of affairs.

"Resolved therefore that this Board of Trade urges upon the Dominion Government to take such legislative action as may be necessary to secure:

(a) The control and purchase of all silver produced in the Dominion at a fixed price of eighty cents per ounce fine silver for a period of two years or so much shorter or longer a time as may be necessary to secure the desired objects;

(b) The withdrawal of an agreed amount of one dollar bills from circulation and the substitution of minted silver dollars:

"Be it further resolved to draw the attention of the Dominion Government to the fact that the United States continues to purchase silver under the Pittman Act at 99 1/2c per oz. and to issue silver currency in lieu of paper money, and that still further coinage is advocated, thereby removing the metal from the world's market and making for the maintenance of silver values at a price higher than the eighty cents per ounce mentioned at the opening of this resolution. And be it finally, "Resolved to urge upon the Dominion Government the vital necessity for expeditious action in order that the mining of silver and associated metals may proceed upon a profitable basis, thus assuring to mine operators an appropriate equality with producers in other countries; and to miners and the many occupations dependent upon mining operations relief from unemployment; and to the country at large greater prosperity than now is enjoyed."

The Nelson Board of Trade also sponsors a resolution calling for the establishment of an ore-testing plant in Eastern British Columbia. This is a matter which has been brought to the attention of the federal authorities on many occasions and is one which, some time ago, it was thought had been disposed of when

the House of Commons passed an appropriation providing for the finances necessary for the purchase of the necessary site and plant.

The Nelson branch of the B. C. Prospectors' Assn. held its annual meeting recently with J. W. Mulholland in the chair. It was reported that the Government's exhibit of the rarer minerals was in preparation and soon would be ready for display. Hon William Sloan was re-elected Honorary-President and other officers were appointed as follows: President, J. W. Mulholland; vice-president, C. E. Crossley; secretary, Fred. A. Starkey; treasurer, Robert Elliott. M. H. Baskin and J. P. Sherran were elected to the Executive.

A number of resolutions are being drafted for presentation to the Provincial Minister of Mines. One protests against alleged favoritism in the construction of mining trails; another asks for further protection against the loss to prospectors and miners by reason of the breaking into cabins, caches and closed mines; a third requests the establishment of a government winter school for prospectors; and finally the government is to be asked to obtain for prospectors blasting powder at cost.

"Righteousness and Righteous Laws for the Slocan" is the subject of a letter written to a British Columbia paper by C. F. Caldwell, General Overseer of the Christian Catholic Apostolic Church in Zion, and prior to his acceptance of that office better known as an energetic mine owner and operator in this Province and the Northwest. His effort is not alone interesting because of the knowledge of its author of mining matters in the Canadian West but by reason of the unique manner in which religion and the business of mining are associated.

"We are of one mind," says Mr. Caldwell, "in that our ore should be milled or smelted in Canada. It should be done in the interests of mines, miners, mine owners, and business-men, and not alone for the smelting trust, who, with the C. P. R. are destroying the value of all mines not owned or controlled by them. We can't prove this statement to the Government, although we know it to be true, unless we unite as one man and ask the government for a Royal Commission, namely, one chosen by the Independent Mine Owners' Association, one by the Smelter and one by the Government..... Any other solution or kind of Commission not allowing the mine owners one man chosen by themselves will keep us in our present deplorable condition —abandoned and idle mines, slow starvation and death to the Slocan."

He continues: "Now is the time of all times for the agitation for the remonetizing of silver in the interest of Canadian silver mines, as and for the only means of saving the world from bankruptcy. And now as I am giving my mind and life in upholding His teaching, I realize by His spirit, that to be right is to be victorious that the centralized money power acting as a unit under one head, and in one mind, succeeded in demonetizing silver in 1873, one of the most successful but demoniacal acts, destroying one half of the basic money of the world, doubling all the debts of the world and enslaving all the debtor nations and all money borrowers in the interests of the money lending Jews and Shylocks. It was the greatest crime that ever was committed against commercial civilization."

Two events of interest to the mining fraternity are to take place shortly in the Pacific Northwest.

The first of these is the Annual Convention of the western division of the Canadian Institute of Mining and Metallurgy to be held at Vancouver from the 9th to the 11th of February.

At Spokane Wn. from February 28th to March 5th will take place the annual Northwest Mining Convention. While the technical features of the programme have not yet been announced there is no doubt that they will be worth while. Socially there is no question but that the delegates will be well taken care of. An exceptionally fine exhibit of the minerals of the northwest is being assembled for the occasion.

THE COLLIERIES.

The improvement shown by the figures of 1920 over those of 1919 in respect of coal production, which amounts roughly to 500,000 tons, is one of the outstanding features of the Annual Preliminary Report of the Minister of Mines.

There is no doubt, on this showing as well as on the basis of general indications, that the coal mining industry of the Canadian West is recovering from the comparative slackness which resulted when fuel oil became firmly established as a formidable competitor both in the industrial and the domestic fields.

The year 1920, it is believed, marked the turn of the tide in British Columbia. Besides during that twelve month there were not the serious labor disturbances that marked the previous year, and this applies particularly to the Crow's Nest Pass Field. With all the old collieries working pretty well to capacity, with attention being turned to an ever greater extent to coal because of the evidences that America's stock of oil is not inexhaustible, and with new foreign markets developing, it is confidently predicted that the output of 1921 will show a further advance.

Following are statistics showing the British Columbia coal production by districts in 1920:

PRODUCTION OF COAL BY DISTRICTS IN 1920

Vancouver Island.		
Canadian Western Fuel Co	666,756	
Canadian Collieries		
Comox	459,206	
South Wellington	91,469	
Extension	199,297	
Pacific Coast Coal Co	94,776	
Nanoose-Wellington Co	41,879	
Granby Company	201,678	
Vancouver Nanaimo Co	1,441	
	1,776,500	1,776,500
Kootenay District.		
Crow's Nest Pass Co.	707,507	
Corbin Coal Company	154,858	
	862,365	862,365
Nicola Princeton including Telkwa.		
Middlesboro Collieries	93,617	
Fleming Coal Co	32,118	
Coalmont Collieries	9,022	
Princeton Collieries	19,068	
Telkwa Coal Co	1,579	
	155,404	155,404
	1,155,404	
Total		2,794,269

MINERAL PROSPECTS IN SOUTH-EASTERN MANITOBA.

We have received a copy of a new Bulletin published by the Government of Manitoba, issued from the office of the Commissioner of Northern Manitoba, and prepared by J. S. DeLury of the Department of Geology of the University of Manitoba.

During the Summer of 1920, Prof. DeLury, assisted by Messrs. L. G. Thompson and R. W. Hiebert, of the Department of Geology, University of Manitoba, examined the Rice Lake and Maskwa River Districts, and a description of these districts forms the larger part of the subject matter of the Bulletin.

In addition, Prof. DeLury states that he has been for several years in touch with developments in an area he names the "Boundary District", embracing the country adjacent to West Hawk, Star and Falcon Lakes, near the Ontario boundary. A sketch map of this district, with a descriptive chapter forms the concluding portion of the Bulletin. A bibliography is appended.

Southern Manitoba is the original province, as it was prior to 1912, and one-eighth of it is covered by the waters of Lakes Winnipeg, Manitoba and Winnipegosis, all draining into Lake Winnipeg and finding an outlet to the sea by way of the Nelson River to Hudson's Bay.

Gold was found in the Rice Lake district in 1911, and fresh discoveries of gold- bearing quartz have been made every year in that district since the first discovery. In recent years some of the rarer metalliferous minerals have been found in the drainage area of the Lake of the Woods, and nickel and copper have been located in the Bear (Maskwa River) area,—(see Dr. Colony's paper, reproduced from the Bulletin of the C. I. M. & M. in our issue of 26th. Nov. 1920).

The country has been very recently glaciated, and some interesting photographs of the effects of glaciation are included in the Bulletin. For this reason, the Bulletin states, the original altered rocks show at or near the surface, and the sinking of deep shafts to ascertain the nature of the primary ores is not necessary. Prospecting and sampling of an ore body are thus rendered comparatively simple.

The gold occurrences of the Rice Lake district, the local geology and the status of properties in various stages of development are dealt with in full detail. As a corrective to some of the promotion literature a perusal of this part of the Bulletin is recommended.

Prof. DeLury summarises the position of the Rice Lake District as follows:

"In the history of mining development in Manitoba, " the Rice Lake district wears the aspect of an old " camp. It has received attention for a period of only " nine or ten years, four of which were the years of the " war. This is a comparatively brief time for the de- " velopment stage of a mining district...To some, the " district appears as one which has gone through all " its stages and has not been proven. This attitude " is decidedly unfair, as the district is still, relatively " speaking, in an early prospecting stage. To one " passing through, and impartially examining the " whole district, it is apparent that there is a huge " area of attractive prospecting ground, containing " some possibilities in the deposits already located in " its smaller areas, and greater possibilities in its " larger, unprospected, areas."

No property in this district has as yet attained the rank of a producing mine, and the district has suffered from lack of transportation facilities. In conclusion, the Bulletin states "it will be surprising if in " future years the Rice Lake district is found to have " no workable gold deposits. The duration of these " years will be lessened if a spirit of co-operation is " fostered, and active steps are taken to check ex- " aggerated stories and illegitimate promotions, both " of which have done the district an infinite amount " of harm in the past."

The "Boundary District" contains showings of mineral deposits of varied type, including gold, bismuth, galena, sphalerite, chalcopyrite, pyrite, pyrrhotite, arsenopyrite, molybdenite, bismuthinite and scheelite. There are few areas anywhere, it is stated, that can show so many occurrences of deposits with such a variety of ore-minerals. These are said to merit further investigation.

A Montreal Letter

By ALEX. GRAY.

Penalizing Silver.

It is refreshing to have "The African World", of London, take up the cudgel in behalf of silver and in doing so to denounce the latest edict by which the Imperial Government reduced the silver contents of their subsidiary coins. This "half-and-half" debased money is a species of false pretenses, and the Financial Editor of "The African World" goes at the matter in this vigorous fashion:

"It is a pity that steps cannot be taken to withdraw the new half-and-half coinage which is now being put into circulation. I am well aware that it will be said that even when the silver coinage was .925 fine it was only a silver token coin, and that it therefore does not matter if the metallic contents should be further diluted. I cannot agree with the reasoning. A good deal of our present internal troubles have been caused by the general impression that a Government can issue an unlimited quantity of currency. Over and over again I have heard it argued that as the authorities could issue as many Bradburys as was wanted for the war, the same can be done for social purposes, and I am afraid the issue of the new silver coinage will be pointed out to our workers that the purchasing power of our currency pound in gold-using countries has fallen to nearly 14s. It is not obvious to them, and what is not obvious does not exist. At the present price of silver there is no excuse for the reduction of the silver contents of our coins, and instead of withdrawing the old silver coinage steps should be taken to retire the new issue."

Of course the Imperial authorities will not recede unless there be more than casual protest against this penalizing of silver. Canadian mineowners may not have much weight at Westminster; yet they ought to place on record their objections to the degradation of the metal—and the impression it will leave with the laity. Certainly it is poor economy to make a sixpence pass for a shilling.

Miners' Altered Wage Scale.

While a great many miners are idle, those in employment could not expect to escape from the general trend of wages. Butte companies made a start a few days ago by putting into effect a new scale under which all miners receiving $5.75 or more a day were reduced 75 cents. Bonus payments to employes on a salary basis also were reduced. At the same time several of the iron ore companies made a cut of 15

per cent. in wages. So the inevitable is happening. If Canadian miners gracefully accept the situation, mineral production may be accelerated sooner than it will be otherwise.

British Columbia Prospects.

Outputting data for 1920 coming from Minister Sloan make it apparent that British Columbia mines and metallurgical works have earning capacity meriting more support. Gold production is downright disappointing, although Mr. Sloan hopes normal conditions will remedy this. The total gold produced was $2,707,698. Not half the Hollinger output. Trail operations, and those of the Dolly Varden and Premier Mines, enabled the Province to establish a record for Zinc and to maintain silver production. In zinc and coal 1920 was the banner year for the Pacific province. However, the grand total of $35,380,625, including building material, is altogether too inadequate for a great section that has been sorely handicapped by world-wide conditions, plus long hauls and high freights.

Death of Benjamin B. Lawrence.

The death of Benjamin Bowden Lawrence at New York, on January 21st, will be regretted generally throughout the Ontario North Country. In the earlier years of Cobalt, he was active and prominent as a Mining Engineer, representing more particularly the Lewisohn-Steindler interests. He was born in New York State sixty-three years ago, graduated from the Columbia School of Mines, engaged in engineering work throughout the American West, Mexico and Cuba, and was highly esteemed in Canada. He was the first alumni trustee of Columbia University, and at the expiration of his term was elected a life member of the board of that institution whose graduates have contributed so much toward the development of Ontario's gold and silver fields.

How Will Mines Fare?

It appears to be understood that the Ottawa Government will substitute a Turnover Tax for the Profits Tax. This, it is presumed, will apply upon all sales. Instead of "taking it out of the rich", as Mr. Otto Kahn puts it, all would have to contribute in proportion. But how the levy upon the turnover is to be applied to mining is going to cause hesitation until details are officially forthcoming. Such a tax might raise large revenue from general sources, and yet it might retard mining expansion. Has anyone who comprehends the economies of mining enterprises been consulted in this vital matter?

Stealing Our Thunder.

An Oklahoma correspondent of the "New York Evening Post", who bewails the curtailment of operations throughout the southwestern oil fields, has this by way of encouragement to those seeking new pastures:

Reports of Alaskan Gusher.

> "Meanwhile, oil men in the mid-continent field are hearing reports from oil prospectors who are rushing toward Alaska, where the discovery of gushers adjacent to the Mackenzie River has precipitated a stampede. According to one report sent to a Tulsa oil man from Edmonton, Canada, a gusher at 783 feet has been discovered upon a lease of the Imperial Oil Company, Ltd., a Standard Oil subsidiary."

There has been an impression that this "gusher" is in Canadian territory, even though it be 900 miles as the crow flies from Edmonton and 1,500 miles by "the water routes now in use."

Perfection of Engineering.

The career of Herbert Hoover since he left his Hawkeye State home has been so stellar he might be said to have an empyrean all his own. Throughout both hemispheres — in Asia, Australasia, Africa, Canada, the United States and London — his name for twenty years has stood for fiscal and scientific rectitude. If some of his mining enterprises have not worked out to schedule and reorganizations or consolidations rather emphasized oversights while remedying overdrafts, at no turn in the road to his engineering and financial pre-eminence has he been other than a distinctive personality of probity-professionally and in his public work. His present purpose is to hasten the millenium when there will be no strikes, no waste, no animosities as between employes and employers—when the efficiencies will be a matter of mutual, voluntary effort. Through the American Engineering Council of the Federated American Engineering Societies, of which he is President, plans for perfect harmonies throughout are to be devised in co-operation with labor and commercial organizations. It is in that connection Mr. Hoover has scheduled the following as the part to be played by the Engineer:

> "It is the function and province of the engineer to make the correct analysis, to predict effect through known causes. It is purely the mission of the engineer of wide experience or great foresight and of unselfish motive to see to it: first, that every action is based upon the principles of honesty, justice, and fairness to the employe, the employer, and the public; second, to formulate the plan of action as to eliminate all unfair provisions of employer and employé and to make it possible for each to fulfill its responsibility to the community, and, third, to so organize the plant or industry as to make it exceedingly difficult for an incompetent to hold a position of authority or to have autocratic control."

Nothing could be finer than this as an ideal. The capable, conscientious engineer whose dictum would bring about the relationships outlined, also would require psychic force and accident insurance against board room direction. Before the industrial world is Hooverized in this manner—however commendable the objective-human nature will have to be deflated. To have efficiency and fellowship with unselfishness and incompetence eliminated, is a "tall order". Yet, whatever is accomplished, should be extended by at least evolutionary process. The spirit of unity preached for centuries still requires considerable intensive cultivation. In many ways Mr Hoover has proven to be evangelic.

British-American Oil.

Offering by Carl H. Pforsheimer & Co., of New York, "of a limited amount of stock of the British American Oil Company" stock, serves to direct attention to the probability of Canada having a real oil movement. This firm has a semi-official relationship with paramount oil interests, has more or less to do with the higher class oil stocks dealt in on the New York Curb, and when it offers an issue due notice is taken of it. The British American Company recently acquired the assets and the business of the Winnipeg Oil Company which operated in the Canadian Northwest and was the marketing agency for central Canada, having a refinery at Toronto. As the British-American Company controls about 25,000 acres in the Canadian Northwest, in sections where drilling is progressing,

it looks as though important people are bestirring themselves.

"Controls" De Beers.

New York newspapers announce the arrival there of Sir Ernest Oppenheimer, and hail him as "one of the richest men in South Africa, who controls the Kimberley diamond mines and is Chairman of the Anglo-American Company—which owns diamond and gold mines." In this there is some truth, and fiction. Undoubtedly Sir Earnest is identified with the Anglo-American Company—which includes Morgan, Guaranty Trust, W. S. Thompson, and other interests, that took over the German Southwest African diamond mines, and also is associated with the Mines Selection Corporation at the Rand—but to credit him with "control" of the Kimberley mines—De Beers—is rather stretching it. The Barnato interests are predominant in De Beers, as well as in the Premier and Jagersfontain mines. Sir Ernest and his colleagues are important factors in the arrangement by which the market for diamonds is regulated. It was he who offered handsome honorariums for the first South Africans to win Victoria Crosses in the late World War. Otherwise he was prominent in patriotic and philanthropic work, but "Solly" and "Jack" Joel have more De Beers in their strong boxes.

BOOK REVIEW.

COAL IRON AND WAR.—A Study in Industrialism Past and Future. By Edwin C. Eckel. 8 by 5½ inches. Cloth Boards. 375 pp. with Index. Henry Holt & Co., New York.

Major Eckel is a well-known authority on the iron ores of the American continent and Newfoundland, and while his most recent work is addressed to the people of the United States, it is noteworthy for a consistent fairness towards the peoples and the achievements of the British Empire, and in its numerous references to Canada and Newfoundland.

While the title of the work intimates strong stressing of the importance of coal and iron in international relations, and an all too rare appreciation of their bearing upon the balance of national power and the migration of industry, the author reviews also the world influences of petroleum, natural gas, and water power; the precious metals, commercial metals; and chemical and industrial materials. In regard to gold, Mr. Eckel shows by graphs of index numbers, population, and gold production, that there is much to be said against the traditional views of economists regarding the tendency of increased gold output to raise commodity prices. An interesting statement is that at the date of the discovery of America the entire gold possession of all Europe was only one hundred million dollars worth of gold in any form, or less than one-quarter the annual gold production of the world at this time. The tremendous increase of gold production commencing about 1885 coincided with the lowest prices of the century.

Mr. Eckel emphasises the great lead that Britain had in the industrial revolution that followed the application of steam power, and proves that this revolution reached different countries at different periods, that it is not necessarily a slow process—to emphasise which he instances Japan,—and that it is not dependent on the genius of any particular people, but is rather conditioned by possession of the essential materials. He views the effect of tariffs as negatory in the long run, and calls the embargo on foreign imports,

"that most futile of political expedients." Mr. Eckel's views on tariff questions are refreshing, and what one might expect from a writer who sees that invention and discovery and possession of the essential materials will always outrank legislative attempts at controlling the evolution of industrialism. To discussions on the tariff and resulting literature he credits the vast growth of the paper industry in the United States—something in regard to which Canada is not entirely guiltless. To the existence, and unequal distribution of coal and iron ore over the earth, and to the concentration of industrial development in favored regions which has resulted, the author credits the repeated changing of the balance of power in the world, effects which he states are not yet finished.

Petroleum does not, Mr. Eckel believes, provide any permanent substitute for coal. "Our children will in all probability see the end of the petroleum industry." His remarks on Canada in this connection were made before the discovery of oil in the Arctic Circle.

The calculations on iron ore reserves are of much interest to Canadian readers, inasmuch as Mr. Eckel allows a life of 45 years, at annual shipments of 55 million tons, to the ores of the Lake Superior region. He states that every year sees a fall of about one-half of one per cent in the metallic content of the iron ore used in the Northern United States, wherein there is conveyed a palpable hint regarding the leaner ores of the Lake Superior region that lie in Canadian territory.

The duration of the iron ore deposit of Wabana, Newfoundland, at present shipment rates of one million tons annually is placed at 4,000 years, only approached by Cuba, which, at an annual shipment rate of two million tons, is given a life of 1,500 years. The iron-ore beds of Newfoundland are stated to be true sedimentary beds, and Mr. Eckel criticises as "one of the most persistent of scientific stupidities" that theory of their origin by replacement from the surface, wrongly applied to the ores of Lorraine, and also to those of Wabana and Alabama. In each case, states Mr. Eckel, this opinion has cost a lot of money, "and in the case of Lorraine it has cost a war."

The concluding chapter of "The Future of World Competition" appraises very fairly the charged position of Britain arising from her dwindling fuel supply, but states that "in the Dominions and the colonies overseas there lie the means for renewing the ascendancy of the Empire as a whole. It is overlooked by those who think only in terms of acreage and population, that in Canada and in Australia there are very large coal supplies, very accessible for water shipment, while in South Africa and India there are large but important deposits. Eastern Canada will come day become one of the great steel exporters of the world."

As the possessor of the greatest coal resources in the Empire, the coming industrial importance of Canada is very plain to those who read history in terms of coal and iron.

With regard to the East, Mr. Eckel does not fear Japan as an industrial competitor, because of that country's lack of coal and iron, but with regard to China, his view is summed up in the statement that the Hangyang steel works, could even now, if they had any surplus for export, lay down finished steel products in San Francisco more cheaply than could any American steel works." Mr. Eckel sees no

reason why the growth of Chinese industrialism should not be concentrated into ten years, and he intimates his belief that "the chief industrial features of the "next two or three decades may easily be the growth "of Chinese industrialism."

In his last chapter the author discusses the possibility of future wars which he considers will arise from unequal national distribution of important natural resources.

We consider Mr. Eckel's book to be a most important one, and worth the perusal of persons interested in mining in Canada. The character of the work merits a review of unusual length. F. W. G.

BOOKS ON PETROLEUM.

The sustained interest in petroleum technology is shown by the continued appearance of books on specialised phases of this growing industry, which has now an importance in Canada that it did not have before the Fort Norman strike. The McGraw-Hill Book Company announce the publication of three new works concerned with the petroleum industry since the beginning of the year. Particulars are as follows:

THE EXAMINATION OF PETROLEUM.—6 by 9 inches. 591 pp. with appendices and Index. By W. A. Hamor and F. Warde Padgett. First Edition. Price $6.00, postpaid, New York.

This new and very detailed manual on analytical bitumenology is one of the volumes of the Technochemical Series of the Mellon Institute of the University of Pittsburg, of which Mr. Hamor is the Assistant Director. His associate in the authorship is Prof. Padgett of the University of Oklahoma. The work is one of especial value to petroleum chemists, dealing as it does with the analytical examination of crude petroleum, petroleum naptha products, illuminating oils, lubricating oils and greases, and the sampling of petroleum oils. Other chapters deal with the characteristics of bituminous road materials, with the evaluation of oil-shale, and the laboratory side of the operation and control of benzol-recovery plants. The work should be useful to those concerned with the chemical side of coke-oven by-product plants, particularly where utilisation of the tar-products for road material and the manufacture of benzol is in operation. Canadian references to asphaltic limestones and sands, of the Athabasca River type, refer only to reports of the Mine Branch at Ottawa, but the work is purely confined to technical evaluation, and does not deal with deposits. The significance of benzol and benzol-gasoline mixtures as motor fuels is referred to, and some laboratory methods of the Koppers Company are published.

GEOLOGY OF PETROLEUM.—Dr. W. Harvey Emmons, University of Minnesota. First Edition, 1921. 6 by 9 inch. 600 pp. with Index. 254 maps and illustrations. Price $6.00 postpaid. New York.

Dr. Emmons, whose status is too well-known to require emphasis, states in the preface that his work is based on a series of lectures given by him in courses on economic geology. Out of twenty-eight chapters, fourteen deal with the general subject of petroleum geology and occurrence, and the other chapters describe particular oilfields. The references to Canada are full and well illustrated, and citations of the authorities are given. Recent as the work is, it does not contain specific reference to the Fort Norman discovery, but it is interesting to note that in the sketch map of Canada and Newfoundland (after Clapp) the presence of petroleum is noted at approximately the position of Fort Norman on the Mackenzie River.

A perusal of the work indicates that oil geology is now a very definite science, with a large literature and a much wider knowledge of world occurrences that would have been thought possible twenty-five years ago. A significant phrase is "that the most thoroughly explored countries have been the most productive." The author gives small credence to the inorganic theory of petroleum origin. With regard to the Canadian protagonist he states: "Coste has defended the inorganic theory, but most of his assumptions are unsubstantiated."

The book is an authoritative and timely monograph on the economic geology of petroleum and gas in all the explored portions of the world.

FIELD METHODS IN PETROLEUM GEOLOGY.—By G. H. Cox, C. L. Dake, and G. A. Muilenburg. First Edition, 1921. 5 by 7¼ inches. Limp leatherette backs. Price $4.00, New York.

A handbook of field minutiae, written for those with moderate familiarity with the principles of geology, surveying and mathematics, including at least trigonometry. The introduction summarises the theory of oil occurrences. The instruments commonly used by the oil geologist are described; the various geological criteria used in correlating beds and identifying structures are discussed, and full detail is given regarding personnel of field parties, actual field procedure in reconnaissance and detailing, and the preparation of the final map and reports. Surveying tables are appended.

The adaptation of ordinary surveying practice to the specialised requirements of oil geology, necessitating observations of altitude and rapid estimation of levels at great distances, is described, with the special instruments recommended.

THE ARCTIC OIL FIELD.

A Yukon Viewpoint.

Yukon will do well to look into the possibilities of the oil strike in the Mackenzie River valley in the vicinity of Fort Norman. It may that a great traffic in oil and similar products from that region will develop in the near future. If so, the business likely will pass through Yukon Territory. In that event Yukon would be very much on the map and as a consequence of extensive activity this territory would receive a tremendous impetus.

By examination of the map it will be seen that Fort Norman is close to the sixty-fifth degree of latitude, or about one degree north of Dawson. The official application for a pipe line route for taking the oil out of the country says that the route will be down the Mackenzie, thence across the divide and down the Porcupine, and it is further announced in press dispatches that the plan of the promoters is to pipe the oil to Bering sea and from some point on that coast ship it by tankers to world markets.

It is well known that Bering sea is frozen solid more than half of the year. If the oil could be piped to a more southerly point it would reach Pacific tidewater south of the Bering sea and at a port where ships can come and go the year round. For instance, if a route could be found for a pipe line to Skagway, it would have to pass through the heart of Yukon, and the trend would be a little southerly. Examination of the map shows that there are several passes in the Rocky mountain range to the westward of Dawson which

The Canadian Miners' Buying Directory.

Acetylene Gas:
Canada Carbide Company, Ltd.
Canadian Fairbanks-Morse.
Preet-O-Lite Co. of Canada, Ltd.

A.C. Units:
MacGovern & Co

Agitators:
The Dorr Co.

Air Hoists:
Canadian Ingersoll-Rand Co., Ltd
Mussens, Limited.

Alloy and Carbon Tool Steel:
H. A. Drury Co., Ltd.
International High Speed Steel Co., Rockaway, .
Peacock Brothers Limited.

Alternators:
MacGovern & Co

Spielman Agencies, Itegd

Aluminium:

Amalgamators:
Northern Canada Supply Co.
Mine and Smelter Supply Co
Wabi Iron Works.

Antimony:
Canada Metal Co.

Antimonial Lead:
Pennsylvania Smelting Co

Arrester, Locomotive Spark:
Hendrick Manufacturing Co.

Arsenic White Lead:
Conlagas Reduction Co.

Assayers' and Chemists' Supplies:
Dominion Engineering & Inspection Co
Lymans, Limited
Mine & Smelter Supply Co.
Pennsylvania Smelting Co.
Stanley, W. F. & Co., Ltd

Ash Conveyors:
Canadian Link-Belt Company

Ashes Handling Machinery:
Canadian Mead-Morrison Co., Limited
Canadian Link-Belt Co., Ltd.

Assayers and Chemists:
Milton L. Hersey Co., Ltd
Campbell & Deyell
Ledoux & Co.
Thos. Heys & Son
C. L. Constant Co.

Asbestos:
Everitt & Co.

Balls:
Canadian Foundries and Forgings, Ltd
Canadian Steel Foundries, Ltd.
Hull Iron & Steel Foundries, Ltd
Fraser & Chalmers of Canada, Ltd
Peacock Brothers Limited.
The Electric Steel & Metals Co.
The Wabi Iron Works.
The Hardinge Conical Mill Co.

Ball Mills:
Hardinge Conical Mill Co.
Hull Iron & Steel Foundries, Ltd.
Mine and Smelter Supply Co.
Fraser & Chalmers of Canada, Ltd
The Electric Steel & Metals Co
The Wabi Iron Works.

Balances—Heuseer:
Canadian Fairbanks-Morse Co., Ltd
Mine and Smelter Supply Co.

Babbit Metals:
Canada Metal Co.
Canadian Fairbanks-Morse Co., Ltd
Hoyt Metal Co.

Ball Mill Feeders:
Fraser & Chalmers of Canada, Ltd
Hardinge Conical Mill Co.
Hull Iron & Steel Foundries, Ltd

Ball Mill Linings:
Hardinge Conical Mill Co
Hull Iron & Steel Foundries, Ltd

Belting—Leather, Rubber and Cotton:
Canadian Fairbanks-Morse Co., Ltd
Canadian Link-Belt Co, Ltd
The Mine & Smelter Supply Co
Northern Canada Supply Co.
Jones & Glasco

Belting:
R. T. Gilman & Co
Gutta Percha & Rubber, Ltd

Belting—Silent Chain:
Canadian Link-Belt Co., Ltd
Hans Renold of Canada, Limited, Montreal, Que
Jones & Glasco (Itegd.)

Belting (Transmission):
Goodyear Tire & Rubber Co

Belting (Elevator):
Goodyear Tire & Rubber Co

Belting (Conveyor):
Goodyear Tire & Rubber Co.
Gutta Percha & Rubber, Ltd.

Blasting Batteries and Supplies:
Canadian Ingersoll-Rand Co., Ltd
Mussens, Ltd.
Northern Canada Supply Co.
Canadian Explosives, Ltd.
Giant Powder Co. of Canada, Ltd.

Bluestone:
The Consolidated Mining & Smelting Co

Blowers:
Canadian Fairbanks-Morse Co., Ltd
MacGovern & Co., Inc.
Northern Canada Supply Co.
Fraser & Chalmers of Canada, Ltd.

Boilers:
Northern Canada Supply Co.
Canadian Ingersoll-Rand Co., Ltd
Marsh Engineering Works
MacGovern & Co., Inc.
R. T. Gilman & Co.
Fraser & Chalmers of Canada, Ltd.
The John Inglis Company
Wabi Iron Works.

Blue Vitriol (Coniagas Red):
Canadian Fairbanks-Morse Co., Ltd.

Bortz and Carbons:
Diamond Drill Carbon Co.

Boxes, Cable Junction:
Standard Underground Cable Co. of Canada, Ltd
Northern Electric Co., Ltd.

Brazilian Rough Diamonds:
Diamond Drill Carbon Co.

Brazilian Mica:
Diamond Drill Carbon Co.

Buggies, Mine Car (Steel)
Hendrick Manufacturing Co

Brazilian Ballas:
Diamond Drill Carbon Co.

Brazilian Rock Crystal:
Diamond Drill Carbon Co.

Brazilian Tourmalines:
Diamond Drill Carbon Co.

Brazilian Aquamarines:
Diamond Drill Carbon Co.

Bridges—Man Trolley and Rope Operated—Material Handling:
Canadian Mead-Morrison Co., Limited

Bronze, Manganese, Perforated and Plain:
Hendrick Manufacturing Co.

Buckets:
Canadian Ingersoll-Rand Co., Ltd
Canadian Mead-Morrison Co., Limited
The Electric Steel & Metals Co
R. T. Gilman & Co
Hendrick Manufacturing Co.
Canadian Link-Belt Co., Ltd
Marsh Engineering Works
Mussens, Ltd.
MacKinnon Steel Co., Ltd.
Northern Canada Supply Co.
Fraser & Chalmers of Canada, Ltd
The Wabi Iron Works

Buckets, Elevator:
Canadian Link-Belt Co., Ltd
Hendrick Mfg. Co
Peacock Brothers Limited.

Cable—Aerial and Underground:
Canada Wire & Cable Co.
Northern Canada Supply Co
Standard Underground Cable Co. of Canada, Ltd

Cableways:
Canadian Mead-Morrison Co., Limited
Fraser & Chalmers of Canada, Ltd.
Mussens, Ltd.
The Wabi Iron Works
R. T. Gilman & Co

Cages:
Canadian Ingersoll Rand Co., Ltd., Montreal, Que
Northern Canada Supply Co
Fraser & Chalmers of Canada, Ltd
The Electric Steel & Metals Co
The Mine & Smelter Supply Co
Mussens, Ltd.
The Wabi Iron Works

might be suitable for the crossing of the oil lines. Even if it not be practicable to pipe the oil in winter, the route through Yukon to Skagway or vicinity would have a tremendous advantage in being shorter and in reaching the coast a thousand mile or more farther south. The ocean steaming in the aggregate for the fleets of the future which thus would be saved would be tremendous.

Construction of a pipe line through Yukon would mean great outlay of money alone, and would create a big initial expense as well as subsequent distribution for maintenance. The opening of such enterprise might with it the incentive for a railway. Couple the demand for such service for the oil business with that for the new silver camps and other Yukon enterprises and there is a multiplied inducement.

The whole thing is of such promise that representative Yukon organizations and others interested may feel assured their time will not be spent without hope of big advantages if they will look into the possibilities of getting the oil of Fort Norman sent out this way. A stampede is in sight or already under way to the new fields. Yukon should not be slow in rising to the opportunity.—"Dawson News."

TO WHOM IT MAY CONCERN—Party wanted to finance mining claims, undeveloped 2 lots, 146 acres on Great Northern Road, Northern Ontario, Canada Good water, easy transportation Canadian Northern Railway, picked ore assayed gold $166.00 per ton, silver 82 ounces per ton. Owners have no funds to carry on. For further particulars write John Foote, 84 Eastern Ave., Toronto. Thos. E. Crisp, 139 Seaton St., Toronto.

EDITORIAL

APPROPRIATE LEASING UNITS FOR OIL LANDS.

The action of the Minister of the Interior in suspending the privileges of staking oil lands in the Northwest Territories until the regulations can be revised is what might be expected of careful guardians of the natural resources of the State. Some months ago, this journal called attention to the new mineral-leasing laws of the United States, which make it incumbent upon the Geological Survey, Department of the Interior, to determine the geological structure of producing oil or gas fields, and to advise the Government on the division of the public domain into "appropriate leasing units."

In the "Atlantic Monthly" for February 1921, Arthur D. Little, of New York, writing on the "Fuel Problem," states in regard to oil and natural gas in the United States:

"These wastes of natural gas, which is an ideal fuel, " and the losses and maladjustments which attend the " orgy of petroleum production, again afford glaring " examples of the need of a constructive national po- " licy for the development of our resources.....So " long as ownership of portions of a common reservoir " of oil is determined by vertical boundaries, each " owner can hope to secure his own only by getting it " before his neighbor. The result is necessarily hur- " ried, unregulated and wasteful production."

There are other considerations that need the thoughtful attention of Ottawa, connected with civil government, transportation and the protection of the public from "wild cat" promotions.

If, under these conditions, the Government should take time to reconsider the whole situation, it would appear to indicate a sense of due responsibility that calls for commendation, rather than criticism, at least until the nature of the revised regulations is made known.

No legitimate interests are likely to suffer at the hands of the Canadian Government, who will doubtless have in mind the large expenditures and the energy that has been necessary to disclose the presence of oil near Fort Norman, and will realise that the greater problem of geeting the oil to a market has yet to be solved. This is a problem that will call for larger expenditures than have yet been made, and some entirely novel departures from hitherto general practice will be required, because the Fort Norman oil-well and any others that may be tapped in the future in the Mackenzie River Country, have a climatic environment and a remoteness from settlements that are unique in the oil business.

Moreover, while the presence of oil has been indubitably proved, and the geological conditions suggest the existence of a large reservoir of oil, this last-named condition is as yet only a presumption, and not an ascertained fact.

It would be difficult to exaggerate the significance, and the importance of the Fort Norman oil-strike, to Canada, and the country generally will commend any attitude of Government that indicates a desire to act only if fortified by full possession of all the relevant facts.

PORCUPINE GOLD-REDUCTION MILLS DECLARED NON-TAXABLE.

The Appellate Division of the Supreme Court of Ontario has decided that the mills of six gold-mining companies in Tisdale Township, namely those of the Schumacher, Dome Lake, McIntyre-Porcupine, Dome Mines, Porcupine Crown Mines and the Davidson Gold Mines, are exempt from taxation under subsection (4) of Section 10 of the Ontario "Assessment Act". A long-continued dispute, which turns upon the interpretation of the word "concentrator" in the aforementioned sub section, is this decided in favor of the gold mining companies against the Township of Tisdale.

In the first instance the companies appealed against assessment of their reduction mills for taxation, and the Court of Revision for Tisdale Township decided in favor of the miners. The District Court on appeal reversed the finding of the Revision Court. On further appeal, the Ontario Railway and Municipal Board re-

versed the judgment of the District Judge of the District of Temiskaming, and the finding of the Board has now been upheld by the Supreme Court. The text of the judgment of the Board was published in the "Journal" of March 5th 1920, see page 177. The gist of the Board's decision is expressed in its conclusion that "the term 'concentrator' is a term loosely applied by technical men to various kinds of mills in various localities, and is not a rigid term of fact having a strictly defined signification, and that a mill of the kind in question on these appeals is not disentitled to be termed a 'concentrator' by reason of its combining chemical processes — the amalgamating or cyaniding, or both — with mechanical apparatus in separating values from mineral-bearing ore."

The effect of the decision appears to be, from the point of interpretation of the loosely-applied term "concentrator" that any part of the process of extraction of gold bullion from the native ore, or gold-bearing rock, is covered by the term "concentration."

THE RAILWAYS AS PIONEERS.

Canada has railways of which she might well be proud. To the men who built these railroads belongs no small share of the credit of Canada's prosperity. It is nevertheless seldom that anyone admits in Canada that our railway builders are respectable citizens. It is quite true that when we are away from home we tell with pride of the great accomplishments of these men and we take special pleasure in talking about the great Canadian Pacific Company and the younger Mackenzie-Mann enterprises. But here in Canada criticism of the railways and their builders is a popular sport. We don't like to give the railway companies credit for anything. As we were in the position of buyers we were satisfied with modest appraisals of the value of the railroads. The Public Ownership propaganda has been carried so far that our great railway builders must have long since lost their halos. They have to be content for the present with the knowledge that they did good work which will be recognized as of National importance some day.

Railways and development of natural resources go hand in hand. The great increase in Western Canada's grain production came with the railway extensions that made settlement reasonably easy. Our mineral output has been largely determined by the facilities for transport by rail. The bringing of forest products to market is largely a railroad problem. The railways made possible the development of our basic resources and the development of those resources on the other hand has given the railway companies their chief source of income.

The part that railways play in developing new industries is well illustrated in Northern Ontario. The great Sudbury nickel industry is the result of the discovery of nickel-copper ore at the Murray Mine during construction of the railway. The millions that have been made by mining silver at Cobalt are the direct result of discoveries made by workmen engaged on construction of the Ontario Government Railway. The possibilities of the great gold deposits at Porcupine remained unknown until the near approach of the railway made access to the district fairly easy. The development of water powers and building of great pulp and paper mills in the heart of the Northern forests is also a direct result of railway construction. The agricultural settlement of this district is being slowly accomplished and would not have warranted the building of the railway, but will be a permanent result of the establishment of the other industries which the railway make possible.

There is being agitated now in Northern Ontario the construction of an eighty mile railway to traverse the country between the Ontario Government Railway and the Canada National Railway. This area is known to have resources that should be developed and the construction of a railway here may reasonably be expected to have such results as did the building of the Ontario Government railway from North Bay to Cochrane. As in that case no guarantee can be given that the road will be a financial success. Those who build it must take a chance. Now that we have made private enterprise in railway building so unattractive we must look to Governments for this pioneer work.

Whether Governments wish to take the pioneering risks or not remains to be seen. It is common opinion that Governments should take an active part in the development of natural resources and it may be that the history of the Ontario Government railway enterprise will be considered as a fairly good indication of what may result from the construction of the proposed railway from Swastika to Westree. Along this line mineral deposits are already being developed at Matachewan, Gowganda and Shiningtree. There is an abundance of timber and pulpwood along the route and some good agricultural land. If the Ontario Government would take some interest in the project and have a topographical, geological and forest survey made of the route, it would probably be found that there is good cause for asking that the road be built. Whether the present Ontario Government is ready to do pioneering work or not is as yet unknown.

R. E. H.

"SCIENTIFIC AGRICULTURE."

The latest professional periodical to commence publication in Canada is "Scientific Agriculture", the official journal of the Canadian Society of Technical Agriculturists.

A perusal of the contents of the first number discloses numerous points of contact between the mining industry and agriculture as it is practised today. The man who first fashioned the metal point that turned the primitive wooden stick into the predecessor of the modern many-bladed plough that follows the mechan-

ical tractor, was presumably both miner and metallurgist, and the dependence of agriculture on the products of the mine has been steadily growing ever since.

In the new magazine there are articles dealing with insecticides and fungicides, with grasshopper control in the West, and with the control of various plant and animal diseases obtained by use of mineral poisons. The manufacture of fertilizer from phosphoric iron-ores, of ammonium sulphate and motor-fuel from the destructive distillation of coal, the use of various chlorides as fertilizers, and the effect of the fumes from metallurgical processes on farm lands, are some of the points where the farmer and the miner come into contact with each other, and there are many others. The first historic conflict between the farmer and the miner-metallurgist took place between Abel and Cain, and it is not recorded that either participant benefitted from the fight. The analogy holds true today, and in the Canadian West the traditional evolution of mining alongside agriculture is taking place. One is the complement of the other, and any dispute as to precedence or pre-eminence is bootless, and may even, as in the Rabbinical tradition, have undesirable ending.

GOLD PRODUCTION A PUBLIC SERVICE TO CANADA.

The suggestion comes from Cobalt that the Minister of Finance would be a welcome speaker at the Ottawa Meeting of the Canadian Institute of Mining and Metallurgy, and that he might clarify the ideas of members on the gold standard. Sir Henry Drayton's comprehension of the economic situation of Canada was disclosed by the searching and pertinent questions that he put to those who appeared to give evidence before the Cabinet Committee on the Tariff, and a word from him on the country's gold reserve, the relation of increased gold production in Canada to the rate of international exchange, and the gold standard, would clear the minds of mining men of a number of erroneous conceptions that are apparently abroad.

For example, a tax on gold used in the arts is again proposed, as it was proposed by the American Mining Congress in Denver recently, and at the Vancouver Meeting of the C. I. M. & M. in November 1919. This proposal suggests two standards for gold, and is wholly unsound, as gold is **the standard.** It is no more possible to have two gold standards than to have a foot-measure of varying lineal distance. A new standard of gold value might be adopted, and has indeed been suggested, but a standard that varies is no longer standard.

A clear exposition of Canada's credit position, given by some competent authority, would indeed be a welcome feature of the proceedings of the Annual Meeting of the Institute. It might tend to reconcile miners to taxation, and it certainly would stimulate their desire to produce those materials from the mine which are so essential to restore our credit.

There are an awful lot of things connected with currency and exchanges that obfuscate the thinking of all who are not specialists in the matter—and these are mighty few—but it is most clear that the more new gold Canada can produce at this time, the better. If some outstanding political or financial leader in Canada could be induced to tell the members of the Institute precisely why this is the case, and hammer home his words with figures, it might hearten some to know that in addition to some varying amount of personal pecuniary advantage, the gold producer in Canada is performing a real public service.

ROMANCE BRINGS UP THE DAILY PLANE.

The Winnipeg "Free Press" is running an advertisement of an air-service from McMurray to Fort Norman, beginning first of May, eight hours from point to point.

The aged and sated Hebrew who, not far from the "slime-pits" of the Vale of Siddim, concluded that there was no new thing under the Sun and that all was vanity, could not foresee that the Valley of the Euphrates would witness the incoming of men from countries unknown eagerly searching for oil, and that one day men would fly from the ashphalt beds of McMurray to a far northern point with the same quest. Kipling said that Romance brought up the 9-15, and Mr. Wells has no sooner completed his Outline of History, when a new page is inscribed that transcends in bald fact the poetical imaginings of the masters of Romance.

For once, at least, there is seen a new thing under the Sun, and, not for the first and may be not for the last time, the antidote to boredom and satiety has come from Canada. If Canada does not produce great literature it will not be for lack of the stuff of which dreams are made, and, quite incidentally, pockets are lined

The Pittsburgh Coal Co. is stated in a "Boston News Bureau" item to have maintained reasonable prices for its product during the recent days of high coal selling prices, having quoted $3.75 for running and $4.00 per ton for screened coal throughout the period. Similar prices are now being quoted by the large Company.

In a smaller way, the Dominion Coal Company followed a similar policy in Nova Scotia, and generally speaking, it will be found that unification of mining operations under single control tends to stabilization of selling prices, avoiding undue [illegible] in times of demand, and preventing disastrous [illegible] in times of little demand.

So far as the smaller operators are concerned, the existence of large companies is helpful, providing a reservoir of labour from which they can draw in busy times, and supplying in bad times that stiffening of selling prices that prevents widespread collapse of mining undertakings that are not buttressed by substantial financial reserves.

Recent Developments in the Microscopic Study of Coal

By REINHARDT THIESSEN.*

(Paper given before the Coal Mining Institute of America, Pittsburgh, December 9th, 1920).

(Continued from Page 64, issue 28th Jan. 1921.)

In recent years investigations of coal were mainly taken up by botanists from a botanical standpoint. Much credit for the resumption of the work on this line of attack must be given to David White, of the United States Geological Survey. White saw that in order to get a proper understanding of the nature of coal it must be attacked from the botanical side first and from the chemical side later; also that its study must begin with the peats and continue successively on through the lignites and the sub-bituminous coals into the bituminous coals.

Before actual microscopic examination of coal could begin, difficulties in preparing it for examination had to be overcome. This in itself proved to be no small problem. Then before the investigation of the nature of coal could be attacked, the knowledge relative to the subject available in other branches of the sciences, such as geology, botany, chemistry, colloid-chemistry, physiography and fossil botany, had to be collected and brought into harmony.

Technique.

The great hindrance to the investigation of coal has been the difficulties encountered in preparing it for examination. From the time of Witham and Hutton to the present day, the one great difficulty has been to make thin sections for microscopic observation. Many attempts have been made to overcome this and to devise and discover means in other directions towards better results. For a number of years a method was pursued that might be termed the "ash method." Small bits of coal were carefully burned, either partially or totally, and the remaining skeleton of ashes examined under the microscope. Among such investigators were Reade, Phillip, Goeppert, Bailey, Tesehemacher and Ehrenberg. Goeppert seems to have become quite efficient in this method, as a large amount of his knowledge of the coal was obtained in this way. The method, however, proved unsuccessful in general and led to no important results. Other methods were tried but without success.

Frank Schulze devised a maceration method. Schulze had been accustomed to purify cellulose by means of nitric acid and potassium chlorate. It occurred to him to test coals for residual cellulose by the same method, and so he discovered that coal could be macerated by first treating it with a mixture of nitric acid and potassium chlorate and then digesting it with ammonia. By watching the latter reaction under the microscope much of the structure in coal may be observed. Guembel applied this same method with great success. It is mainly through this process that he gained his great insight into the nature of coal and was able to make the first adequate contribution to knowledge of the structure of coal. This method is now generally used to supplement the microscopic examination of thin sections. Quite recently Jeffrey, of Harvard, has tried to overcome the difficulties of cutting thin coal-sections by first treating the coals alternatively with a mixture of hydrofluoric and nitric acid and with alkalies and finally heating them in a hot ether and absolute alcohol solution. These treatments were supposed to soften the sample and then permit cutting it with a sharp knife into thin serial sections. Nothing was gained in execution by this method, and besides, the original condition of the coal was entirely changed. It was no longer coal.

Ground Thin Sections Found Most Reliable.

Thiessen finally adapted the old and ordinary methods, used from the first, to his needs. It is the same method successfully used for many years by petrologists and fossil botanists. The method, as adapted, is, in brief, as follows:

A small rectangular piece of coal to be examined is polished on one surface. By means of a mixture of about 1 to 2 parts of marine glue and 3 to 4 parts of Canada balsam, heated to a proper consistency, the polished surface is cemented permanently to a glass object-slide. The piece is then ground down roughly to within a safe thickness on an ordinary lapidary's wheel, and is finally ground down by hand on a very fine hone until thin enough to be transparent.* Oil-shales are prepared in the same way. From 8 to 12 sections can be made in a day. The coal in such sections is entirely in its original condition. Sections can thus be cut from any desired part of the coal, either cross-wise to the bedding planes or horizontally with them, and studied at any magnification possible and photographed.

The Banding of Coal.

Every ordinary bituminous coal has a more or less pronounced alternate banding of bright and dull layers. (Photograph 1, for which see last issue.) This phenomenon had long been noticed but was first observed in connection with microscopic work by Witham and Hutton, and later more definitely defined by Dawson and Wethered, who called the layers "bright coal" and "dull coal" respectively. Potonie, who called them "glanz" and "mat" coal made them the object of considerable discussions and theoretical work in order to explain them.

It has now been definitely determined that the bright bands represent constituents that at one time were pieces or fragments of wood of varying sizes and that the "dull coal" represents layers compiled of constituents that at one time were smaller fragments of wood interlayered by macerated plant-matter or "debris" derived from many kinds of plant products, called the "attritus." Photographs 1, 2.

Bright Coal or Anthraxylon.

Many sections have been made of the bright bands and examined under the microscope and in every case it has been shown that they were derived from pieces or fragments of wood such as parts of stems, limbs, branches, twigs and roots. Woody structure has been preserved in all of them. (Photograph3). In some cases such constituents represent quite large pieces, but most of them represent but minute fragments. Between these two extremes all sizes are present. These constituents are always flat, the semi-decayed wood having been at one time soft and pliable, has been compressed and flattened. Being constituents derived from

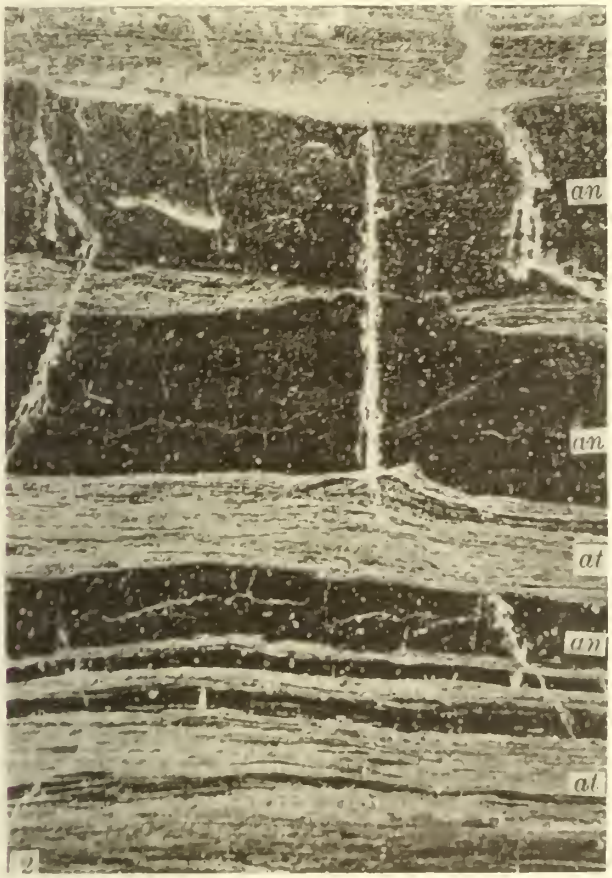
*A fuller description of the method is to be found in Bull. 117, "Structure in Paleozoic Bituminous Coals," U. S. Bureau of Mines, 1920.

wood now turned into coal they have been called anthraxylon, meaning wood coal.

Study of Formation of Peat a Good Guide.

The nature of the anthraxylon may best be elucidated through a study of peat. It is now generally admitted that coal was formed in a manner similar to the formation of peat today. The whole process can therefore be studied at first hand through the observation of peat. Peat may be taken as the first step and lignite as the second step in the process of coal formation.

Peat is a deposit of semi-decayed and semi-macerated plant products formed in a wet or poorly-drained area.



2—A part of a vertical cleavage face of coal magnified ten diameters, photographed by reflected light. The black bands (an) represent anthraxylon, the light striated bands (d) represent the dull coal. It will be noticed that the latter is compiled of black and light striae, the former represent anthraxylon and the latter attritus.

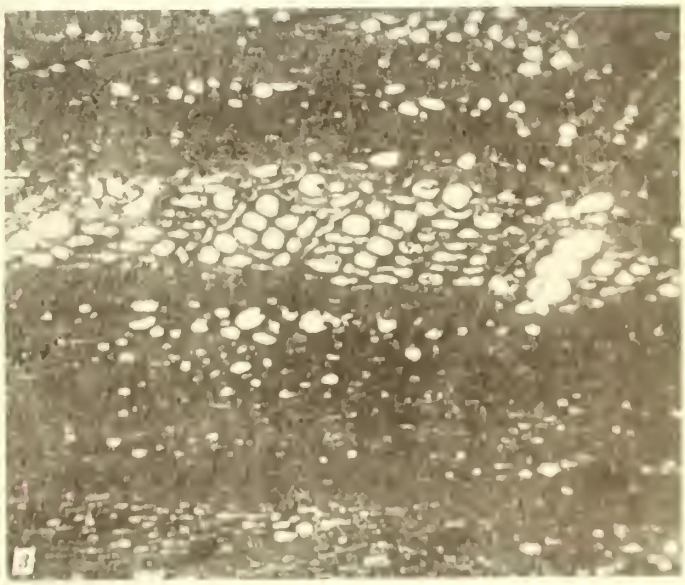
In it are found all the plant products that vegetation growing in it may yield. The woody plants are by far the most important and the most abundant in the peat-forming processes, and woody matter forms by far the largest part of the deposit. The best examples are the deposits formed of and now covered with dense growths of trees adapted to a very wet condition. (Photo. 1—a., see last issue). As already intimated, the plant products are semi-decayed and in various stages of maceration. The harder or more woody parts have resisted maceration more than the softer parts, such as bark, young parts, leaves, etc. But much of the wood has also been disintegrated and has been transformed together with the other products of decay, into a general "debris."

The Characteristics of Peat Substance.

We have then a mass that consists of semi-decayed tree trunks, limbs and roots and fragments thereof embedded in a mass of "debris." When this general "debris" is more closely examined it is found to consist largely of smaller fragments of woody matter in the shape of chips or fragments of stems and twigs. These are again embedded in a mass that consists of very finely macerated plant-matter. It has very much the appearance of mud. When examined under the microscope, it is shown to consist of bits of all kinds of tissues and plant cells and fibres of all kinds, besides pollen grains, spores, cuticles, resinous matter and some dirt. The mass of this plant matter, most of which consist of woody matter, is in a very peculiar physical condition. It has been turned into a sort of a jelly that has retained the plant structure and contains more water than plant matter. It is the nature of substances in this condition to form a hard, rather brittle mass when dried. Mature peat has exactly that property—one of the first conditions necessary in the progress towards coalification — and when dried is very coal like. Unmatured peat may be brought into this condition by artificial means, and when dried resembles bituminous coal in many respects.

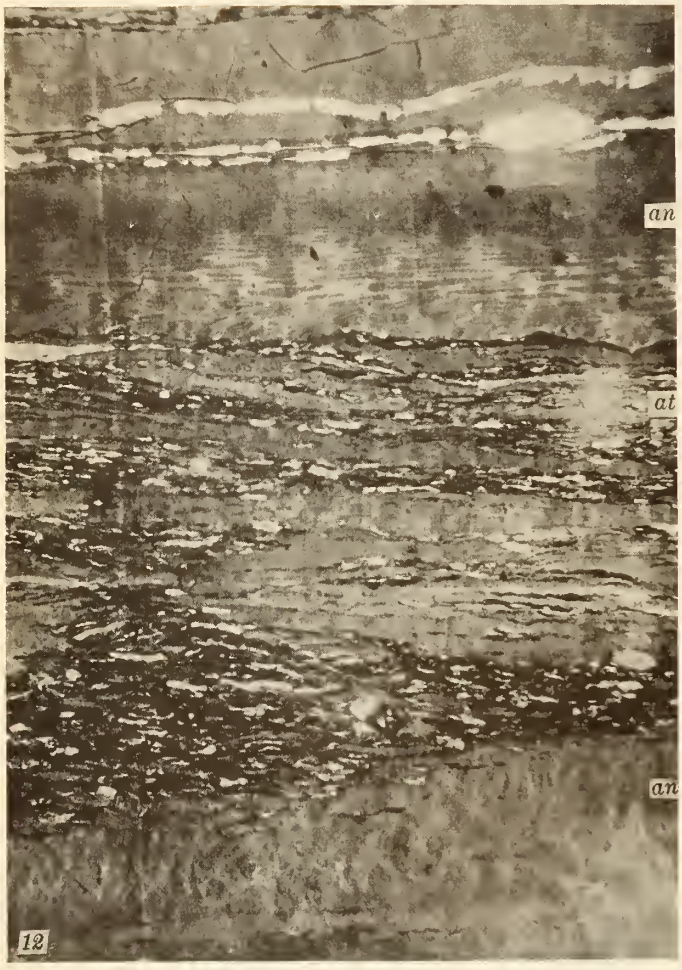
Lignite and Sub-Bituminous Structure.

The lignites are very similar in compositions to the peats. But in the lignites all the plant matter has been compressed, flattened, and hardened, and deprived of much of the original water. Coalification has taken place to a considerable extent, but has not nearly been completed. Indications show that it once was in the same peculiar physical condition described as characteristic of peat.



3—A thin cross section of anthraxylon or bright coal showing well preserved cell structure including resinous matter. Magnification 60.

The sub bituminous coals, the geologists tell us, were formed during the same time as the lignites. Some are part of the same bed, some in fact are younger than the lignites. But in the sub bituminous coals the coalification has proceeded farther than the lignites, through the effects of earth movement, or, as the geologists call it, dynamic action. Microscopic examination shows that on the whole sub bituminous coals are composed of the same kind of plants and the same kind of plant fragments as the lignites. It is hardly necessary to say that plant structure has been retained to a large extent in the lignites and in the sub bituminous coals,



12.—Thin vertical section of coal from the lower Freeport seam, showing thin bands of anthraxylon (an) and attritus (at).

but it is important to emphasize, as we go from peat to lignite and from lignite to sub-bituminous coal, that the plant structure has been more and more effaced, or obscured, because the mass has been more and more compressed and hardened, and has become more opaque. When we come to the bituminous coals the coalification, in general, has proceeded still further, and hence we should expect the plant structure to be still more effaced, or rather made less evident. The fact is that it has not been effaced,, but the structures have been still more hidden or obscured. Every anthraxylon in every coal examined has revealed abundant woody structure. (Photograph 3).

Dull Coal.

The duller portions of the coal are shown on close examination to be composed of numerous thinner strips of bright jetty black coal interlayered by a granular-appearing mass, the attritus. (Photograph 2). The black jetty strips represent, like the larger portions of bright coal, or anthraxylon, constituents derived from woody matter. Woody structure is preserved in all of them. (Photograph 12). Some of them represent small chips of larger stems, branches or roots, others represent fragments of smaller branches, twigs or roots and still others represent twigs, rootlets and petioles themselves. There is in reality no boundary line between the larger and the smaller to the smallest layers of bright coal. There is a gradual transition in size from the largest to the smallest. It is safe to say that in all of them, plant structure is abundantly preserved and that there is no cubic centimeter of coal in which there is no plant structure left. It may not always be easily discernible in cross-section but in horizontal sections it is always revealed.

The Attritus.

The pieces of bright coal are embedded in a mass that has been derived from all kinds of plant products, such as finely-macerated woody matter, bark, pith, cortex, leaves, leaf stalks, plant fibres, plant cells and parts of the same, all derived from the cellulosic parts of plants; among these are distributed constituents that stand out clearly, such as resinous matters, spores, and pollens. This part is called the attritus. (Photographs 2, 5, 6, 9, 12). Intermingled with this are to be found cuticles, megaspores, sporangium walls, carbonized parts of tissues and cells, sand particles and other mineral matter.

All the plant matter has been subjected to putrefaction and decay, and at one time was soft and pliable. It was later compressed and flattened to the bedding planes. The attritus has been generally referred to as the ground mass, fundamental matter and binding matter. The different constituents named are present in greatly varying proportions. Sometimes it may consist largely of spores instead of woody matter, and then again of resinous or cuticular matter, or of earthy matter.

All Bituminous Coals Derived from Woody Growths.

In the foregoing analysis it is seen that all the ordinary bituminous coals were derived largely from woody growths. The peat bogs that gave rise to them consisted of wooded swamps similar to those found in Minnesota, Wisconsin (photo 1—a) and Michigan and

5.—Thin cross section of coal from the Brookville seam showing the general appearance of dull coal; (an) represent thin anthraxylon constituents, and (at) the attritus, the latter composed of spore-exines, cellulosic degradation matter, resinous matter and some inorganic matter. Magnification 200.

Dismal Swamp of Virginia and North Carolina. The lignites of North Dakota and Montana are completely analogous to these and form intermediary steps between peat and coal.

By far the largest part of the mass of the ordinary coals then is made up of woody matter. By woody matter is meant all that which is generally understood under the term wood, such as comprise the tree trunks, branches, limbs, twigs and roots. This wood, of course, is present in various degrees of fragmentation as already noted. The larger fragments are represented by the bright or glanz coal; the small fragments by the thin sheets of bright coal in the dull coal. In the attritus there is further represented woody degradation matter in a finely divided state where it is mixed with other

9.—Thin vertical section of coal from the Upper Freeport seam, composed chiefly of attritus with a few thin strips of anthraxylon. Magnification 200.

plant matter such as resins, spores, pollens, cuticles, bark, etc.

It should be noted that besides that part of the plants generally designated as wood, such as the stems, branches and roots, the more delicate part of the plant also contains woody matter. The cell walls of succulent plants, the leaves and their petioles, the bark, growing parts and pith all contain the same substances that compose wood, namely cellulose and ligno-cellulose. The macerated matter of all of these contributed to the attritus. It is clear, then, by far the greater part of coal is derived from woody matter, and a very large share is derived from wood that is that part of the plant usually termed wood.

Lomax and Glover see but little evidence that coals

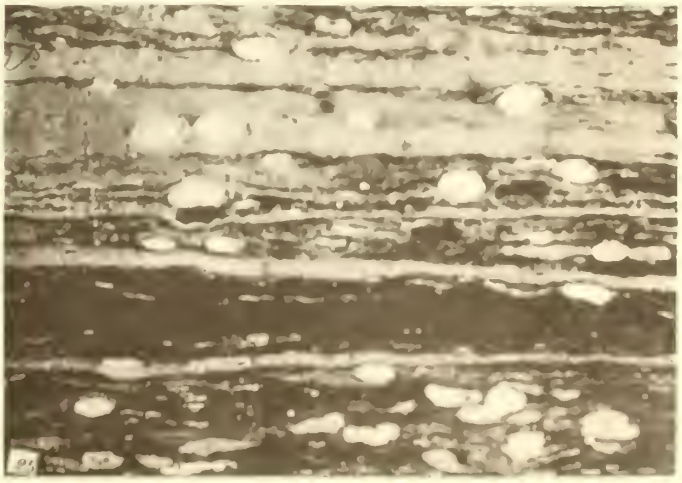
6.—Thin cross section of Pittsburgh coal, consisting mostly of attritus including some thin anthraxylon strips and resinous particles. The attritus is rich in spore matter. Magnification 200.

contain any great amount of matter derived from woody parts of plants such as stems and branches, and what there is occurs in the form of mineral charcoal. They conclude that the ordinary bituminous coals have been derived mainly from the droppings of trees and plants in the form of spores, fruits, leaves, twigs and sometimes fragments of stems. If this is true our whole conception of coal formation has to be changed. We have here no deposits analogous to those of their conception.

Resin.

Resins are found in both the anthraxylon and the attritus of coal. Photos. 3 & 25. Much has lately been said about resins in coal. The term is, however, used rather losely and indefinitely. We read of resins, resinous substances, resinic substances, resinic extracts and resinic residues in coal without a definite knowledge as to what they really are.

In the living plants there are so many kinds of resins that it is very hard to define them and bring them all under one head. But in speaking of resins in plants it is usually quite well understood as to what is meant. They have peculiar characteristics of their own that differentiate them sharply from



Thin cross section of [illegible] and showing resinous [illegible]. Magnification [illegible].

other substances. Rosin, Canada Balsam, dammar-resin, and tamarack gum are well known examples.

The chemist who is working with resins has arranged them very precisely and systematically into many groups and kindred orders. To him the large and intricate array of resins is as easily as the outlay of a coal mine is to the coal mining engineer.

Under resins are comprised a very large number of specific substances, most of which belong to the ring compounds. These may be divided into resin acids, resin phenols, resin alcohols, resin tannins and resenes, each group having a large number of members. Several or many of these, as esters (compound ther) or as esters and mixtures, form definite kinds of resins; as rosin and Canada balsam, similarly as

18.—Thin vertical section of coal from the Yagger bed of Alabama. (an) anthraxylon; (at) attritus.

fatty acids and alcohol form fats or oils, as lard, butter and olive oil.

In the peats the resins are readily recognized. They are still in the tissues where they belong when the plant was living without much change in character; or they form a part of the attritus, having been set free through decay, where they are easily determined by means of micro-chemical tests.

In the lignites, resins are found both in the anthraxylon, or woody part, and in the attritus, where they are in most cases easily recognized. The woody parts of the coal, the anthraxylon, has in most cases been well enough preserved so that the generic and in some cases the specific determinations can be made and are found to be closely related to species living today. The resins are in the very tissues where they would be expected, were the tree living. In the attritus of the lignites, it is not quite so easy to determine the origin of all resinous constituents. Most of them, however, can clearly be traced to their sources without a doubt; others are not so clearly defined and their origin is doubtful.

An interesting condition is shown in the anthraxylon of the lignites with respect to the concentration of resinous inclusions. The largest amount of resin in the stems of certain living pines is in the neighborhood of 2 per cent of the dry weight. In the lignites, sample after sample of anthraxylon, shown to be part of a tree trunk, is found where the resin content is far above 12 per cent—in many pieces it is close to 50 per cent. This concentration is to be accounted for in that the wood decayed and disappeared to a large extent while its resin was not decayed and thus was concentrated.

The sub-bituminous coals are similar to the lignites in every respect in regard to the resinous content.

In the bituminous coals also resinous bodies are found both in the anthraxylon and the attritus. An examination of the anthraxylon shows that they are held in the tissues and in the cells where they would be expected to occur were the tissues living. (Photograph 3.) It is fair to assume therefore that they were the natural resins of the plant that contributed to the coal. In some cases such resinous bodies form a considerable part of the coal.

Paleozoic Plants Contained Resinous Matter.

White, through a number of years of experience and study of fossil plants, concludes that the plants of the Carboniferous Period contained as much resinous

4.—Thin cross section of dull coal, Pittsburgh seam, photographed by transmitted light at a low magnification. The narrow lighter bands represent thin strips of anthraxylon or bright coal; the darker, mottled bands between them represent the attritus, showing that the dull coal is compiled of alternate layers of anthraxylon and attritus. In reality the anthraxylon consists of definite constituents embedded in the attritus. Magnification 10.

matter as the plants of the later ages, and that the amount of the wood found in the Paleozoic coals containing resin justifies the conclusion that the quantity of resin contributed by the coal forming plants, and preserved either in place in the wood or as accumulations in various layers of the coal, may have been as great in the Paleozoic as in later periods.

There are also invariably scattered through the attritus of all bituminous coals resinous-appearing bodies, usually of a rounded to oval shape, (Photograph 25), but also of cylindrical and irregular shapes. A good many of these can directly be traced to be of the same origin as those in the anthraxylon, others are

inferred by analogy and through their similarity to those in lignite to be derived from the natural resins; in others again it is not safe to venture any conclusion. On the whole it is quite safe to say that they are derived from plant substances similar to the plant resins of today. The fossil resins, whether found in lignite and coal or in the ground, like amber, fishtelite and succinite, are among the most stable substances known. It took the best chemists years of work to find the composition of fishtelite, for example, on account of its resistant nature. It is therefore, little wonder that the chemistry of coal is so difficult. In view of this fact, if certain constituents of coal, like the resins could be isolated and dissolved, they should yield durable commodities like lacs and varnishes.

(To be continued.)

A Montreal Letter

By ALEXANDER GRAY.

Dumping Zinc and Copper.

While the longer view brings no misgivings as to the future of metal markets, it is frankly acknowledged that current developments are discouraging. A few days ago, Germany dumped 10,000 tons of zinc on this side of the Atlantic, at 4½ cents — which is less than the metal can be produced for in the States. Last year England unloaded a lot of Mexican and European zinc, in Canada. Besides all of this, it is no secret that one of the very largest producers of zinc is "working in the red ink", as a Director expressed it — meaning there is a debit in the present production. As this latter corporation has an investment in its plant of $75,000,000, it is not difficult to understand why there is pressure at Washington for an increased measure of protection and why the Canadian Consolidated Mining and Smelting Company "deferred" dividends. If the exceptional American zinc producer and the largest Canadian Company capable of supplying the market have adverse experiences with cost and metal markets, manifestly there is need of first aid.

Nor is zinc alone in adversity. Copper producers are a long way from being ebullient. They cannot discern buying power, excepting upon credit, and that credit, for the time being, is not forthcoming. Most of the copper companies are prepared to quicken their pace, but disconcerting receipts of old brass, which can be reworked, of old copper and clippings, and of composition metals with a copper content, have not ameliorated the situation. The extent of these brass and copper shipments from European countries is thus summarized in lbs:—

	Old Brass	Old Copper	Composition Metal
1920 (10 months)	34,864,700	9,742,907	2,422,601
1919	15,875,171	1,217,310	355,982
1913	8,726,112	7,253,039	2,211,406

The inference is that European battlefields and munition plant odds and ends are being salvaged. Yet it was understood there is a dearth of copper over there.

Outlook for Silver.

Specialists in the market for silver are not clear in their own minds about the immediate demand. They are rather bearishly inclined, because of Asiatic depression and universal necessity for economy. One authority holds silver to be a luxury and that the peak price of 89½ pence reached a year ago was too abnormal. Under the conditions prevailing, the inquiry for silver is going to be governed by the revival of trade in China and the ability of India to right itself while Europe is so short of funds. The Continent of Europe is a seller of coin, not a buyer for coinage — and the use of silver for plate and jewelry is apt to be curtailed. It is quite obvious from the following review by the bullion house of Samuel Montagne & Co. they are none too optimistic, although these admit Asia may rapidly recuperate:

"The world as a whole would have good reason to welcome the return of the price of silver to a pre-war level. The persistent advance in the price of this metal has much to do with the increase in the prices of commodities, the reason being that the Allies had to depend so largely upon the products of the East, chiefly from India, with whom the world balance of trade has always been — unless the monsoon proved a failure — heavily in her favor. Wheat, rice and beans, jute, cotton, hides and skins figure largely in the useful goods which come from India and China. It was the rise in the cost of such items as these which stimulated that of other commodities in the markets of the world.

The total output for 1920 is not expected to show much change, but the apportionment among the contributing countries will be different. The United States will record considerably less, and Canada will show a further shrinkage. These reduced contributions will be offset by an increase from Mexico and from Burma. The last named mines, worked under British auspices used to be exploited by Chinese. In a similar fashion, Professor Sayce deduces from recent discoveries that Babylonian firms worked the silver mines in Asia Minor centuries before the days of Abraham.

A good deal of misconception outside India as to the rupee problem arises from overlooking the fact that the natives of India regard the question as one of bullion rather than of currency, and choose to set their own ratio between currency composed of gold and of silver. In other words, the two precious metals are looked upon as commodities, the imprints of the die being but an official certificate as to the contents. The Indian government during the year clearly endorsed the native point of view by removing the prohibition against using gold and silver coin otherwise than as currency — thus conferring a privilege not enjoyed in the United Kingdom. Gold and silver coins do not change hands in India to anything like the extent that they do in western countries. They are obviously more treasured than current."

A VERY SWEEPING STATEMENT

"Prior to 1890, Great Britain made more pig iron than the United States. Now we have four times the British capacity. Why? The chief reason is not our Lake Superior ore. We have Alabama ore, Lake Champlain Ores, Cuban ores and Chilean ores. It is not our engineers, nor our blast furnace practice, nor our steel mill practice. The British have or could have all that. The chief reason why our industry is four times the size of the British industry, where a third of a century ago we were a poor second, is that we have the open shop and the British have the closed shop. We have paid much higher wages, but our men have worked and produced much more." "The American Metal Market."

Alkali Deposits of Western Canada

L. H. COLE, B. Sc.

(No. 1 of a "Memorandum Series" issued by the Mines Branch, Ottawa.)

Occurrence.

Natural occurrences of soluble mineral salts are known in the Provinces of Manitoba, Saskatchewan, Alberta, and British Columbia, either in the form of bedded deposits, or as brines. Some are of considerable extent, and are probably of sufficient size to warrant commercial development.

The occurrences of these salts may be broadly classed under two types:—

(1) Solid salts and brines in undrained or partially drained basins;

(2) Brines of the following streams or springs.

Type 1.

Those of the first class are very numerous in the prairie provinces.

It is probable that the accumulation of salts is due to leaching out of the soluble salts in the prairie soils by surface waters, and their concentration and deposition in the undrained basins which are found in the glacial morainic covering of the western prairies.

These deposits are generally of a similar character, although the percentage of the different salts will vary in different localities. In many cases the name 'alkali lake' has been appropriately applied to deposits of this nature, since in the early spring and often into late summer the deposits are covered with water. The water accumulating through the melting snow and rain is often a foot or two in depth, and carries a considerable quantity of the alkali salts in solution. Beneath this water one generally finds a solid bed of crystallized salts. In late summer, especially when the season is a dry one, these so-called lakes become deposits of snow white alkali, which when seen from a distance resemble snow covered basins.

The deposits will vary in size from a few acres to many acres in extent, and in thickness, from a few inches to possibly fifteen feet. The salts are generally found interbedded or mixed with mud or peaty material, and in very few instances are the deposits in a pure enough form to be commercially marketable in their raw state. The mud beds also contain numerous crystals of the alkali salts.

Type 2.

Brine streams or springs occur in many places, and may carry sufficient salts in solution to warrant their commercial exploitation for medicinal and other purposes. In some of the occurrences of this nature the principal salt present is sodium chloride, the other salts being present only in small quantities. The brine springs of northern Manitoba are good examples of this class of deposit.

Composition.

The composition of the salts occurring in these basins consists chiefly of mixtures of sodium and magnesium sulphates in varying proportions, with, generally, small quantities of sodium chloride and possibly other salts such as sodium carbonate, etc.

Sodium Sulphate.

Sodium sulphate in the hydrous form (known as Mirabilite or Glauber's salt) has the following composition:—

$Na_2SO_4.10H_2O$ — SO_3 24.8% (sulphur trioxide) Na_2O 19.3% (soda) H_2O 55.9% (water)

In its pure state it is white, transparent to opaque; and has a hardness, 1-5-2, with a specific gravity, 1.48. It is readily soluble in water, and at first is cool to the taste, and afterwards saline and bitter.

Sodium sulphate in the anhydrous form (known as Thenardite) has the following composition:

Na_2SO_4 — SO_3 43.7% (sulphur trioxide) Na_2O 56.3% (soda)

Its colour, when pure, is white, translucent to transparent, and the mineral has a hardness of 2-3, with a specific gravity of 2.68.

Magnesium Sulphate.

Hydrous magnesium sulphate (known as Epsomite or Epsom salts) has the following composition:—

$MgSO_4.7H_2O$ — H_2O 51.2% (water) MgO 16.3% (magnesia) SO_3 32.5% (sulphur trioxide)

This is a soft, white or colourless mineral, readily soluble in water, and with a bitter saline taste. Its hardness is from 2 to 2.5, and its specific gravity, 1.75

Sodium Chloride.

Sodium Chloride (known as Halite or Common salt) has the following composition:—

NaCl — Na 60.6% (sodium) Cl 39.4% (chlorine)

The natural salt is nearly always impure. It has a hardness of 2.5 and a specific gravity 2.1-2.6. It is colourless or white when pure, but often yellowish, or red or purplish, from the presence of metallic oxides or organic matter. It is readily soluble in cold water, and has a saline taste.

With these salts may be associated other soluble salts such as sodium carbonate, and in small quantities, the salts of the calcium, potassium and alum groups.

On account of the nature of the natural alkali deposits and brines of Western Canada, it will be necessary in nearly all cases to purify the raw product from such deposits, in order to produce marketable commodities. A pure Glauber's salt can be obtained by evaporating the brines or by dissolving the soluble salts already deposited and separating the sulphate of soda by differential crystallization. To produce salt cake from the hydrous salt, it will be necessary to develop processes for eliminating the water of crystallization. Theoretically, this appears easy, but there are a number of practical difficulties in the way of development which have not yet been overcome.

Uses.

Sodium sulphate in the anhydrous form is more commonly by its trade name "Salt Cake". As salt cake, it finds its chief use in the manufacture of sulphate pulp; in metallurgical work, in the refining of nickel; in the manufacture of window, plate and bottle glass; and in making water glass. In the hydrous form, it is marketed as Glauber's salts, and as such, is used in dyeing; in tanning; in the textile industry as a mordant; and in medicine.

Magnesium Sulphate or Epsom salts is largely used in the cotton trade for warp-sizing; it is also employed for medicinal and agricultural purposes, and in dyeing with aniline colours, since goods thus dyed are found to stand the action of soap better.

Sodium Chloride is the ordinary common salt of commerce, and as such, does not need further mention.

Market Situation.

Sodium Sulphate.

So far there has been no steady production of sodium sulphate from the alkali lakes of western Canada. The Salts and Potash Company, Ltd., of Kitchener, Ont., operating Muskiki lake, (Tp. 39, R. 16, W.2nd), Sask., have erected refining plants at their lake and also at Kitchener, Ont., in which they have carried out considerable experimental work and hope shortly to be in a position to place the refined products regularly on the market. The salt cake so far used in the country has been obtained as a by-product from the manufacture of hydrochloric acid. The amount produced by this process in future will necessarily be governed by the market for hydrochloric acid. Glauber's salts are made from the anhydrous form by dissolving the salt cake and recrystallizing below 32.4° C.

Salt cake is manufactured in Canada by the following firms:—

Grasselli Chemical Co., Hamilton, Ont.

Nichols Chemical Co., Montreal, P. Q.

Plants: Sulphide, Ont.; Capelton, P. Q.

Victoria Chemical Co., Victoria, B. C.

The Canadian production of salt cake and Glauber's salts are furnished by the Dominion Bureau of Statistics for 1918 and 1919 as follows:—

	1918		1919	
	Tons	Value	Tons	Value
Salt Cake	6,001	$133,544	3,197	$57,045
Glauber's Salts	2,358	60,281	1,423	45,731

Canadian Imports of salt cake and Glauber's salts are as follows:—

Calendar Year	Amount Salt Cake	Value	Amount Glauber's Salts	Value
	lbs.	$	lbs.	$
1910	17,728,543	95,054	1,080,309	5,217
1911	13,782,241	88,761	1,531,555	7,826
1912	19,243,823	97,768	1,951,619	9,129
1913	25,902,190	133,030	811,053	3,815
1914	38,175,601	170 333	810,062	3,407
1915	30,970,231	147,047	840,994	8,058
1916	42,194,077	178,370	522,703	8 133
1917	71,583,645	560,711	722,913	16,218
1918	68,773,341	676,571	686,712	9,748
1919	17,905,001	343,007	738,123	9,763

Magnesium Sulphate.

During the year ending March 31st, 1920, there was imported into Canada $67,074 worth of Epsom salts, and in the same period 1523 cwt. valued at $893 was exported. This export was from the natural deposits of Epsom salts in British Columbia.

Market Prices.

The market prices of these commodities are constantly varying. The following figures as reported in the Oil, Paint and Drug Reporter New York give the New York market prices for the years 1914 to date:—

	Aug.1 1914	Jan.1 1915	Jan.1 1917	Jan.1 1918	* 1919	* 1920
	$	$	$	$	$	$
Salt cake ground - bbls. per ton.	11.00 to 13.00	11.00 to 13.00	....	30.00 35.00	12.00 to 30.00	17.60 to 60.00
Glauber's Salts, cwt.	0.65 to 0.75	0.60 to 0.75	0.60 to 0.65	0.90 to 1.00	1.00 to 2.25	1.15 to 3.00
Epsom Salt U.S.P. cwt.	not quoted prior to 1918			3.62½ to 3.90	2.75 to 3.62½	2.50 to 6.00
Epsom Salt tech cwt.	1.00 to 1.10	1.75 to 2.00	1.75 to 1.85	3.37½ to 3.50	1.80 to 3.37½	1.75 to 3.75

* High and low figures for year.

MEETING OF SUDBURY BRANCH OF THE C. I. M. & M.

The Sudbury branch of the Canadian Institute of Mining and Metallurgy, held a most interesting session for its members in the Sudbury club on January 26th. The evening was given over entirely to a discussion of technical questions, and papers were read by different mining men, dealing for the most part with past troubles experienced in the different mines and the methods adopted to solve them. There were about thirty-three members of the branch in attendance.

E. Austin, Coniston, opened with a paper on the elimination of blast furnace delays. H. L. Roscoe, of the British American Nickel, touched on "a self-aligning bearing for mine skips".

William Kent, Copper Cliff, dealt with "converter chutes" and F. J. Eager, Levack, outlined a device for filling grease guns. He outlined a device that not only saves grease but also makes for more efficient mining and is applicable to lubrication of mine-drills. It keeps the dirt out and in the amount of grease saved, it pays for itself in a month. It also avoids loss of time in having the machine men running around for grease.

J. G. Gill, of the B. A. N. C., dealt with improvements in the separator of matte and slag in the "settler". Geo. A. Morrison, Creighton, outlined the Creighton Mine orepasses, whereby they are always able to maintain a steady run of ore down to the crushers, despite any interruptions. This is achieved by storage space on every level, leading to the main tramming levels. B. C. Tomlinson, B.A.N.C., gave a paper on the Krone scale for weighing "converter flux" and W. J. Rolfe, Creighton, a paper on the Creighton ore chutes, describing in detail the type worked out there. F. H. Conover, B.A.N.C., detailed a reversing brake device for conveyors, and Frank Taylor, of Copper Cliff touched on converter matte loading. This used to be done by hand, until of late a mechanical device was worked out to do it. R. M. Coleman, Copper Cliff, told of a scheme to prevent delays due to the blast furnace spout wearing out and forcing a shut-down of the furnace.

The next meeting will be in February and will take the form of a smoker with one or more speakers.

COAL PRODUCTION IN ALBERTA IN 1920.

We have received from Mr. J. W. Richards, the Inspector of Mines, Edmonton, Alberta, some preliminary figures of coal production in Alberta during 1920, which compare with previous years as follows:

	(Short Tons.)		
	1920.	1919.	1918.
Domestic Coal	3,358,992	2,611,009	3,035,061
Bituminous Coal	3,418,921	2,325,787	2,982,334
Anthracite.	130,594	85,616	131,225
	6,908,507	5,022,412	6,148,620
Briquettes	101,922	70,033	100,470

No coke was made during either 1920 or 1919. In 1912 coke was made to the extent of 105,684 tons, and in the period 1913 to 1918 about 30,000 tons annually was made, all from beehive ovense. The beehive type of coke-oven may be therefore said to have passed away in Canada.

The coal output for 1920 exceeds by three-quarters of a million tons the record production of 1918. In November 1920 a production for the month of 803,745 tons was recorded, or at the rate of closely approaching 10,000,000 short tons annually. In the Annual Report of the Mines Branch of Alberta for 1919, the Chief Inspector of Mines, Mr. Stirling, estimated the output capacity of the Alberta coal-mines at 9,000,000 short tons, and, as will now be seen, did not err in overstatement, although at the time the largeness of the figure mentioned caused general surprise.

The Drumheller field produced 1,210,687 tons in 1920, comparing with 804,930 tons in 1919.

The most interesting part of the progress of the Alberta coal trade in 1920 is not the capacity of the coal mines to produce the largest tonnage in their history, but the capacity for absorption shown by the surrounding territory. The limit to production in Alberta has always been of that of commercial outlet, but apparently the coal requirements of the area of distribution are increasing, and, what, is not less significant, the radius of distribution is itself being rapidly widened.

Alberta now has a permanent lead in coal production in Canada, which it will enlarge year by year. The coal trade in Alberta is admittedly in a formative stage. As was pointed out very plainly by Mr. Stirling in the 1919 Annual Report, the production is spread over too many openings and incorporations, and much capital has been wasted on openings that have been abandoned. Out of 324 abandoned mines, the Chief Inspector stated that three only had been closed through exhaustion of the coal area tributary to the mine opening.

Jevons, in "British Coal Trade" has a paragraph that seems applicable to the stage of coal-mining through which Alberta is now passing. He writes:

"The technique of manufactures and of mining "which has developed in Europe and the United States "is applicable to any part of the world where there is "a sufficient demand for the products, and the necess-"ary labor can be obtained.

"As soon as there is a fully settled agricultural "population, there arises a demand for manufactured "goods and for coal. For twenty or thirty years they "may be brought long distances; but as soon as large "enough markets are established, capital begins to "arrive so as to produce coal or goods on the spot. "**The stage of mining in a small way will usually be** "**short.** After twenty or thirty years will come the "period of mining large companies owning many "square miles of minerals. To each of them the volume "of output, to the limit the market can stand, is a sure "road to big dividends. The growth of total demand "will then regulate the number of large mining con-"cerns which come into existence."

What is the limit of coal supply the Canadian market can stand? It certainly has never been tested, so far as the production of domestic mines is concerned, but Alberta and British Columbia are about to test not only the Canadian market, but far wider fields.

GRANBY CONSOLIDATED CO.

Its Coal Expenditure.

Boston — In the acquisition and development of its coal property on Vancouver Island, the Granby Consolidated Mining, Smelting, & Power Co. has spent close to $5,000,000.

These expenditures were made since October, 1915, and were comprised of the following items:

870 acres coal land	$320,000
Handling equipment and town . .	1,400,000
Timber claims, saw mill	490,000
Coke ovens	2,470,000
Total	4,680,000

Granby's policy regarding depletion and depreciation has been to make periodical adjustments on its books. The company writes off its depletion on a basis of net reduction in ore reserves compared with total ore reserves, at values commensurate with copper content. It has no definite method of computing depreciation. The general rule followed contemplates amortization less salvage values, of plant and equipment within the life of the mineral properties which they serve. — "Boston News Bureau."

BRITISH GOLD OUTPUT.

While it will be a considerable time before complete returns are available, returns from most of the leading producers of gold within the Empire are now available, and show a general decline on the figures of 1919, as follows:—

	1920. Ozs.	1919. Ozs.	+ or —
Transvaal . .	8,153,625 fine	8,330,091 fine	—176,466
Western Australia . . .	618,577 fine	734,066 fine	— 115,489
Rhodesia . .	522,808 crude	593,222 crude	— 40,414
India	475,893 crude	504,002 crude	— 28,109
Queensland. .	118,476 fine	121,030 fine	— 2,554
New South Wales . . .	48,907 fine	65,839 fine	— 16,932
Canada . . .	773,000 fine	767,167 fine	+ 6,000 about

The foregoing figures are excerpted from the London "Mining Journal", and the approximate production of Canada, as estimated by the Mineral Resources Division of the Mines Branch, is added. It will be noticed that Canada alone, among the British Dominions, increased gold production in 1920 over the previous year, and this increase is all to be credited to the gold mines of Northern Ontario.

Northern Ontario Letter

THE SILVER MINES.

The Cobalt District.

Already there are signs that the mining industry in the Cobalt district is finding its stride under the changed conditions caused by a lower price of silver. Instead of further curtailment, the tendency is now towards a resumption of work at some idle mines and development of new properties.

Apart from the McKinley-Darragh, Beaver Consolidated and the Temiskaming, no important operations have been curtailed. Such mines as the Nipissing, Mining Corporation, Coniagas and O'Brien are running full speed, and operations at not far below full blast are under way at the La Rose, Chambers-Ferland, Hudson Bay and Kerr Lake. Among the new operations coming into prominence is the Bailey Silver Mines where work is being conducted aggressively and exceedingly favorable results are being obtained.

The results so far achieved on the Bailey, added to the comparatively large tonnage of ore in sight at the time work commenced a few months ago, promise the inclusion of this mine among the regular shippers. Not only will a large tonnage of mill-rock be sent to the Bailey mill, but a considerable quantity of high-grade ore is being bagged, and this will be allowed to accumulate until such time as a high-grade shipment may be made. An extensive area of ground of good prospective merit lies directly ahead of the present point of operation, and the development of this property is one of the most interesting pieces of work now under way in this field.

Among the newly incorporated mining companies is the Prima Cobalt Silver Mining Company, Ltd. This company has an authorized capitalization of 1,000,000 shares of the par value of $1 each. Of this amount, 500,000 shares have been allotted to S. Barber, the original owner, and the remaining 500,000 shares will be used for treasury purposes. The property lies in the western part of Coleman township about a mile and a half west of the Montreal River. A number of strong veins have been opened up, in which low silver-values occur together with a comparative high percentage of cobalt. One shaft has been sunk 50 feet and a second pit is now down 20 feet. It is now proposed to instal a mining plant, and part of the equipment has already been purchased. Two 60 h. p. boilers are being hauled to the property, as well as a 4-drill compressor and other corresponding equipment. The plan of operation is to sink to 120 feet before commencing lateral work. Following this, the shaft will be deepened.

Reduced operating costs on account of lower wages and a gradual decline in the price of supplies offers every likelihood of a prosperous period ahead for the silver producers of the Cobalt and surrounding district. The assurance that the Pittman Act will continue in operation in the United States seems to have gone a long way toward stabilizing things. With silver having recently remained steady around 61 to 67 cents an ounce, plus the premium of around 10 to 12 p.c. on New York funds, the margin of net profit indicated at the majority of the mines is very satisfactory, although latest quotations for silver have fallen to below 60 cents.

Capt. Conrad Jorgensen, and H. G. Latilla, both of whom are interested in the Kirkland Lake Proprietary, 1919, arrived in Cobalt January 28th. After a visit to the Chambers-Ferland mine of the Aladdin-Cobalt Company they proceeded to Kirkland Lake to look over the other properties of the new company. By way of explanation, it may be said that the Kirkland Lake Proprietary, 1919, is the new concern which is to operate the merged properties of the Aladdin-Cobalt, Tough-Oakes Gold Mines, Burnside Gold Mines, Sudbury Syndicate and possibly the Sylvanite. The development policy has not been outlined, but may be announced after the annual meeting of the Tough-Oakes Gold Mines.

Much interest is being centred on the operations at the old Ruby Silver Mines. The drift at the 110-ft. level has reached a length of about 100 feet, and an official of the company informs your correspondent that the present face of the drift carries close to 30 ozs. of silver to the ton over a width of close to six feet. The vein itself has widened out to about eighteen inches, and carries patches of native silver, while silver values extend two or more feet back into the walls of the vein.

Reports are denied that the Mining Corporation of Canada has opened negotiations with a view to purchasing the McKinley-Darragh mine. Local officials have received no advice of any such negotiations.

Elk Lake and Gowganda.

A meeting of those interested in the Walsh property in the Gowganda district will be held on February 8th in Montreal to decide upon some course of action. It is understood the prospects for raising funds for development are good. The plan to remove the mining plant to an island in Miller Lake has been abandoned, and effort will likely be directed towards further developing the veins in which native silver has already been found.

Work is at a stand-still on the Collins property in the Leroy Lake section, but arrangements are to be made to haul in supplies this Winter so as to carry on work throughout the Summer. The shaft was sunk to a depth of 300 feet, where considerable water was encountered.

Transportation problems remain difficult in the Gowganda area. Last year's application by private interests for a charter to construct a narrow-gauge railway, which caused the Ontario Government to abandon the plan to build a macadam road, has left the transportation problem as far as ever from a solution.

Ore Shipments.

During the week ended January 28th, two Cobalt companies shipped ore, the following being a summary:

Shipper	Cars	Pounds
McKinley-Darragh	1	80,654
La Rose	1	88,073
Totals	2	168,727

During the corresponding period, no bullion shipments were reported.

THE GOLD MINES.

The outlook of the gold mines in the Porcupine District is uniquely favourable. Ore reserves, in the aggregate, were never previously so large. Labor supply is abundant, and the mine equipment could produce twice or three times the current gold output. These conditions justify a very general enthusiasm in regard to the events of the next ninety days.

Through shortage of hydro electric power more than half of the milling capacity is unused, and the quantity

of crude ore awaiting treatment is such as to promise an unpreecdented yield, for this field, when power is again available. Before the end of the year a production of three tons of gold every month, worth approximately $1,500,000, is looked for. Everything points to record production of gold during the last half of 1921.

Information from the Dome is highly favorable. Developments in the lower workings justify most optimistic views. A large quantity of ore ranging from $7.65 to $20 a ton has been encountered, and mill heads at this mine promise to increase very considerably as a result of further development at this low horizon. According to the opinion of those who should be well informed, the average grade of the ore on the Dome may within the next couple of years approach the high average so far established on the Hollinger Consolidated. That zone lying between the 500-ft and the 1,150-ft. level will probably add substantially to the resources of this property. Those interested in the mine are accordingly looking forward with interest to the returns when the mill will be operating to capacity, shortly anticipated.

Although power shortage has been acute during the past three months, yet it promises to be even more pronounced during February and part of March, and early spring rains are hoped for.

Mining men are making the suggestion that Sir Henry Drayton, Minister of Finance, should be invited to attend the Annual Meeting of the Canadian Institute of Mining and Metallurgy to be held in Ottawa in March. The idea has been mooted that the Government should purchase all the gold produced in Canada, at $20.67 an ounce. Sufficient of this should be retained to keep the country on a gold basis, while the balance should be sold as a commodity at a rate say fifty per cent higher than the standard price. This extra revenue could then be distributed among the mines in proportion to the amount sold to the Government. The scheme, however, appears to be one which it might be difficult to operate unless a similar plan should be followed in the United States. The McFadden Bill in the United States is pointed to as reason for somewhat similar agitation in Canada. At any rate, however, an address from Sir Henry Drayton in regard to the relation of gold production to the amount of paper issued, an explanation of who authorizes the dilution of the country's currency, as well as the relation of gold production to the rate of exchange would be instructive to mining men in general, and gold miners in particular.

Additional stringers have been encountered at the 250-ft. level of the Porcupine-Keora property, situated in the northern part of Whitney township, some six miles from the producing part of the Porcupine gold area. No statement has been made as to the average gold content of the mineralized body.

A TYPICAL STOPE HOLLINGER MINE.
(Photo and others on facing page lent by M. A. A. Cole.)

Reports are current of a possible merging of the La Palm property with the Three Nations. These two properties lie adjacent, and were explored in a fairly aggressive manner in the early days of Porcupine. No information is available in regard to the financial arrangements necessary before operations could be resumed.

An official statement has been given to your correspondent in regarding the results of diamond-drilling in the township of Mountjoy, lying immediately west of the Hollinger Mine area of Porcupine. A total of 6,000 feet of drilling was done. One hole was 1,800 feet in length. The core disclosed prophyry and greenstone schists which is considered a favorable indication. Large quartz veins were also encountered, although no commercial ore was detected in the areas tapped. The drilling was carried on for the purpose of testing

the formation being beneath the sand plains which lie immediately in the strike of the mineralized zone of Porcupine. As a consequence of the encouragement met with, the operators are understood to be preparing to exercise the options held on at least two of the properties. A number of other options may be abandoned. The exploration work was financed by British interests, and it understood further work will be proceeded with in the coming Summer.

Kirkland Lake.

A mining plant is being installed on the Wood-Kirkland property in the Lebel section of the Kirkland Lake district. Just as soon as the equipment is in place, it is planned to continue underground work from the point where left off at the 100-ft. level. At this depth the vein is comparatively wide, and an encouraging amount of ore is in sight. Assays are said to run about $8 a ton across four feet of the vein.

The mining plant on the Bidgood property is being doubled in capacity, and an extensive plan of operation is being planned. Among other things, the shaft will be continued beyond the present depth of 300 feet. D. H. Angus, of the Right of Way Mines at Cobalt will take charge beginning February 1st.

3042 Pouring the Gold—Hollinger Mine

The shaft on the Fidelity property in the northern part of Teck township is being kept pumped out and work is to resume here within a reasonably short time.

Shaft sinking has resumed on the Hunton-Kirkland after a temporary delay. The present depth is about 75 feet. It is proposed to carry the work to a depth of at least 200 feet, possibly 300 feet, before commencing lateral driving.

The power supply in the Kirkland Lake district is now adequate to fully supply the operating mines, but is not large enough to permit any large new operations to start. Consequently, the Wright-Hargreaves may not start its new mill before spring.

The Kirkland Lake Gold Mines of the Beaver Consolidated, is now fully supplied with power, and the output promises to increase considerably from this property.

In all sections of the gold mining areas of Northern Ontario the outlook is entirely favorable for much expansion.

A Prospectors' Class will commence in Haileybury on March 22nd. It will be conducted in the Haileybury Mining School, and will be under direct charge of Dr. W. L. Goodwin of Kingston University. Dr. Goodwin will come to Haileybury direct from Port Arthur where he has held similar classes.

Boston Creek Area.

The crosscut, north from the 500-ft. level of the main shaft has reached a length of 530 feet. Among the numerous veins encountered, the one at present showing in the face is believed to be important. It is associated with the customary dyke, and strikes north-east by south-west, a principal characteristic of the more important orebodies in the gold-mining areas of this country. The dip is about seventy degrees to the south-east or similar to that of the "D" or telluride vein directly above.

Before starting to develop this vein, it is proposed to continue the cross-cut right to the northern boundary, about 150 feet beyond the present point, as this is believed to be the chief area of mineralization in the district. From the appearance of the vein at this level, it would seem that it does not show, or has not been discovered at surface.

The drift north-east at the 500-ft. level is following what appears to be the "D" or telluride vein. At a point 70 feet from the cross-cut, the presence of a "mud seam" is considered a favourable indication.

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Two Gold Bars, valued at $112,000—a weekly shipment of bullion from the Hollinger Mine.

The laboratory sampling and testing outfit has reached the mine, and preparations are being made to instal it at once.

NEW YORK FUNDS PREMIUM AS A HIGH PROTECTIVE TARIFF.

"The existing exchange situation gives foreign nations the advantage of a highly protective tariff, ranging from 20 to 80 per cent, directed against the United States only, and this without creating any unpleasantness. It serves automatically to limit imports of American goods, and to stimulate the sale in America of foreign goods." Edwin C. Eckel, "Coal Iron & War."

PERSONAL.

C. H. Macnutt has resigned the resident management of the Black Lake Asbestos & Chrome Co., Ltd., to take charge of the Vimy Ridge property of the Bennett Martin Asbestos and Chrome Mines, Ltd., Coleraine Que., Canada.

TORONTO MINING STOCK QUOTATIONS.

Quotations on Active Stocks on Standard Stock Exchange for Week ending 29th. January, 1921.

Silver.	High.	Low.	Last.
Adanac Silver Mines, Ltd.	2¼	2⅛	2⅛
Bailey	3⅝	3¼	3½
Beaver Consolidated	36½	35	36
Coniagas	2.00	1.85	1.85
Crown Reserve	20	18	20
Gifford	1¼	1⅛	1⅛
Hargraves	3	2¼	3
La Rose	33	31	31
McKin.-Dar.-Savage	29	28	29
Mining Corp. of Can.	1.10	1.08	1.09
Nipissing	9.00	8.75	9.00
Peterson Lake	11	9½	9½
Silver Leaf	2¼	2¼	2¼
Temiskaming	24½	24	24
Trethewey	19¾	18½	19¾
Gold.			
Apex	2⅜	2¼	2¼
Atlas	24	15½	24
Dome Extension	50	46	50
Dome Lake	3¼	3	3
Dome Mines	13.85	13.25	13.85
Gold Reef	3¼	2¾	3¼
Hollinger Cons.	6.75	6.28	6.60
Keora	24	21	23
Kirkland Lake	50	47	50
Lake Shore M. Ltd	1.23	1.20	1.22
McIntyre	1.90	1.85	1.85
Moneta	11½	11½	11½
Newray Mines, Ltd	5¾	5	5¾
Porcupine Crown	21¾	20	21
Porcupine Imperial	½	½	½
Porcupine Tisdale	1¼	1¼	1¼
Porcupine V.N.T.	23	22	22½
Preston East Dome	3⅛	3⅛	3⅛
Schumacher	25	22½	25
Teck-Hughes	11	10	11
Thompson Krist	7¾	7¼	7¼
West Dome	10¾	8¾	10½
West Tree Mines Ltd.	5½	5	5½
Miscellaneous.			
Ajax Oil	25	20	25
Eureka	20½	20½	20½
Petrol Oil, The	35	35	35
Rockwood Oil, Gas	2	2	2
Vacuum G.	16	13½	16

MONTREAL METAL QUOTATIONS.

Following are fair average prices for ingot metals (in less than car-load lots) at Montreal. Quotations at Toronto and Vancouver are reported unchanged from the figures in the last issue.

	Cents per pound. 26th Jan.	3rd Feb.
Copper, electro	18	17½
Copper, castings	17¾	17¼
Tin	38	36½
Lead	6¾	6½
Zinc	7½	7
Aluminum	34	34
Antimony	7¾	7½

METALS AND PRICES.

("Financial News," London.)

Gold and Base Metals.

Investors in mining shares have experienced anything but good fortune for a considerable time past, and many of them have become distinctly uneasy as to the future. Whether we look at precious or base metal ventures, the position is the same. There are factors in mining that should always be present to the minds of the public, one of the cardinal being, of course, the fluctuating prices of the metals. Until 1919 gold was sold at a recognised level; in fact, it was stable, and, consequently, companies winning it were in rather more favour than the producers of silver, tin, lead, copper, etc. Base metals are subject to the law of supply and demand, while gold aways finds a home, and, though excessive output of the last-named may have affected prices of commodities, there has been no holding up of the metal for favourable opportunities of realising. Now, gold—at least that part of it produced outside the United States—is sold in the open market, and, consequently, investors are receiving the benefit of the excess over the standard, or what, for want of a better term, is called the premium. Had it not been for this premium, gold producing companies would be in as parlous a state as base metal undertakings. At present, the former receive a certain amount of compensation for the higher level of working expenditure, and it may perhaps be assumed will continue to receive it, though much naturally depends upon the American exchange. If this country simply had to rely upon its own trade position, the premium would decline; but so long as other nations with greatly depreciated currencies make London their clearing-house with New York, a full restoration of the £ sterling can scarcely be expected. The outlook for many gold mining companies may therefore be regarded as hopeful.

A Gloomy View of Silver Outlook.

With silver things are vastly different, and the dollar level which American miners had fondly believed to be permanent and something approximating the real value, has sunk very considerably. In fact, so serious is the actual position that a move is on foot to bring about a reduction in output. Perhaps the case cannot be better stated than in the letter written by Mr. Charles Butters to Mr. E. P. Earle, president of the Nipissing Mining Company, of Ontario, which appears in the *Engineering and Mining Journal*, of New York. Mr. Butters discusses the problem from the standpoint of the persons employed and the mercantile community on the one hand and from the point of view of the owners on the other, and arrives at the conclusion that it is far better to keep the ore in the mine than it is to go on and knock the price of silver by producing on such a market as exists at present. "I cannot see the object of increasing the supply of metal," he says, "even if the supply is withheld in the face of such an extremely light demand. . . . Instead of benefiting in the world we are hurting hundreds of millions of people by trying to force silver on the market already surfeited and unable to absorb the smallest amount without lowering the price. I urge every silver and copper mining company to close down definitely for either six months or a year." This is pretty drastic. Whether the Nipissing Board will agree remains to be seen, but there is much force in the arguments used by Mr. Butters. In connection with the low price to which

metals other than gold have fallen it is worth while drawing attention to the fact that the great Anaconda and the Utah Copper to say nothing of smaller producers, have thought fit to pass their dividends.

Tin.

Similar conditions exist where tin is concerned. Apart from some of the Malayan companies, which are, in a sense, protected by being guaranteed a minimum price, the number of mines being operated at a profit is reduced nearly to vanishing point. To begin with the home industry, the misfortunes of Cornwall are only too well known to our readers, and scarcely less so are those of Nigerian undertakings. For months an attempt has been made to stabilize the price of tin, and a minimum of £250 per ton was suggested. The Malayan, Cornish, and Nigerian Chambers of Mines discussed the subject almost *ad nauseam*, and we believe it was the action of the last mentioned that caused the failure of the negotiations. To be quite frank, and the criticism can scarcely be objected to, the Nigerian Boards seem to us to be all at sixes and sevens. There is not that cohesion which would go far to make the success of the industry. Take the labour question, for example. Instead of profiting by the experience of the Rand, and forming a recruiting association, a disposition is manifesting itself for the competitive enlisting of natives. Initial benefits will in the long run disappear, and the whole field will be unfavourably affected; for the wages problem will be an ever-present thorn. It is suggested in more than one quarter that the mines should not win more tin than they can actually dispose of on the market, thus taking a line of action parallel to that suggested by Mr. Butters in regard to silver, and identical with the policy of the United States copper companies. By restricting output hardships would undoubtedly be created; they might, nevertheless, prove small in contrast with the advantages to be gained. Governments have ceased buying metals; some of them still have stocks to work off, and industrial consumption is at a low ebb. There is no reason, however, for despondency. Nations cannot live without work, and work without metals is unthinkable in these days. We have no means at present of gauging the world's stocks; but with reconstruction work in progress, consumption is certain largely to increase. The turn of holders of base metal shares will come in due course, and it would be folly to sacrifice interests at current levels.

PRODUCTION OF GOLD AND SILVER IN THE UNITED STATES IN 1920.

The Bureau of the Mint, with the cooperation of the United States Geological Survey, has issued the following statement of the preliminary compilation of the production of gold and silver in the United States during the calendar year 1920.

State or Territory.	Gold		Silver.	
	Fine Ounces	Value.	Fine Ounces.	Value.*
Alaska	380,034	$ 7,856,000	792,751	$ 804,745
Alabama	10	200	5	5
Arizona	239,118	4,943,000	6,098,251	6,190,518
California	692,119	14,305,300	1,513,495	1,536,394
Colorado	368,298	7,613,400	5,572,407	5,656,718
Georgia	53	1,100	140	142
Idaho	22,509	465,300	7,531,253	7,645,201
Illinois	0	0	8,500	8,629
Michigan	0	0	510,601	518,326
Missouri	19	400	123,219	125,083
Montana	88,971	1,839,200	13,583,164	13,788,677
Nevada	171,968	3,554,900	7,392,689	7,504,540
New Mexico	22,417	463,400	764,586	776,154
North Carolina	53	1,100	11	11
Oregon	46,687	965,100	182,588	185,320
South Carolina	14	300	0	0
South Dakota	203,243	4,201,400	84,351	85,627
Tennessee	280	5,800	112,595	114,299
Texas	5	100	534,212	532,143
Utah	100,446	2,076,400	11,564,155	11,739,121
Washington	7,198	148,800	183,437	186,213
Wyoming	10	200	72	73
Philippines	51,568	1,066,000	21,947	22,219
Porto Rico	97	2,000	135	137
	2,395,017	49,509,100	56,564,504	57,420,325

Compared with 1919 production these figures indicate reduction in gold output of $10,821,000 and in silver output of 117,941 ounces.

* Silver valued at $1.01513 per fine ounce being the average price based on the New York Market Jan. 1 to 17, and $1.00 per fine ounce thereafter. By the terms of the Pittman Act and Mint regulations the domestic silver produced and reduced in the United States subsequent to Jan. 17th is salable to the Director of the Mint at $1.00 per fine ounce.

CANADIAN RAYBESTOS COMPANY.

Realizing the importance of the Canadian Brake Lining market, the Raybestos Company of Bridgeport, Conn., organized, last spring, the Canadian Raybestos Company, Limited, capital stock of which is $250,000.

This step was taken after consideration of the highway program of Canada, which contemplates the expenditure of $50,000,000 within the next five years, and of the status of the automobile industry in Canada at the present time. There are over 350,000 passenger automobiles and motor trucks in Canada at present, which means one car to every twenty-two persons. The rate in the United States is one car to about every fifteen persons but since the cost of automobiles and trucks is from fifty to sixty percent higher in Canada than in the United States, the Canadian investment per capita in automobiles and trucks is considerably higher than that of the United States.

The Canadian Raybestos Company purchased the factory of the Lundy Tool and Shovel Company at Peterborough, Ont., remodelled it, installing a sprinkler system, modern heating plant, concrete floor, new plumbing and a new roof. Machinery for the manufacture of brake lining, molded facings and other products of similar nature was shipped from the States. The nearness of the Canadian Asbestos Mines may lead the Company to set up a spinning department in addition to the manufacturing plant.

The officials of the Canadian Raybestos Company, Limited, are President, Sumner Simpson; Vice Pres., Howard C. Simpson; Secy. & Treas., Robert Abbott; Directors, the above, L. V. Simpson and Morton F. Judd, Mr. Abbott is manager of the Canadian factory. All the officers are connected with the Bridgeport organization. Canadian sales headquarters are at the factory and Henry Ervin is in charge.

HEATON'S ANNUAL.

The 17th edition of Heaton's Annual issued by Heaton's Agency, Toronto, maintains the high standard of former editions. As an indispensable office handbook for commercial and financial firms it needs no introduction, and no public or private library in Canada is complete without it.

In addition to Dominion and Provincial directories, banking and insurance directories, postal, cable, financial and commercial information, which we would expect to find in such a book, the Annual is known as the standard authority on the Canadian Customs Tariff and Regulations, there is a very complete summary of the Income Tax and Sales Tax, and it has two features that are unique: a complete encyclopedia of the Natural Resources of each Province including: Agriculture, fisheries, forest products, fur trade, minerals, water powers, etc., all revised to date, and the official Boards of Trade Register which gives up-to-date descriptions of towns in each province including railways, banks, schools, hotels in order of merit, industries, assessment, population and local opportunities, with clear maps of each province. Smaller places are covered in a Shippers' Guide giving banks, railways and population.

General information includes temperature and rainfall tables, statistics of commerce, population, immigration, transportation, etc., and a complete detailed directory of Universities and Schools in Canada. There are valuable exchange and miscellaneous tables at the end. The illustrated advertisements of the Provincial Governments and progressive towns add interest to the book.

A special section on Manufactures covers, Development of Treaty Making Powers, Statistics of Manufactures, Growth of Home and Foreign Markets, British and American Branch Factories, Industrial Opportunities in each province, Notes on various manufactured products, and statistics of Trade Unions in Provinces and Cities.

NIPISSING MINES COMPANY.

Averages Slightly Better than $1 an Ounce for its 1920 Silver.

Boston — Nipissing Mines Co. averaged slightly better than $1 an ounce for its 1910 silver yield, notwithstanding the probabilities that American companies will show better than $1.15 as their sales average. The disparity was due to the $1 price placed on silver from domestic mines by the United States government and the drop in the open market for foreign products to below 70 cents an ounce.

With the inclusion of $224,000 of cobalt into its last month's operations, Nipissing in December scored the biggest month in its history with production of $507,320 from which there were estimated profits of $412,000.

It has been the idea of the Nipissing management during the past few years to operate the property as nearly like a manufacturing concern as possible with production yielding just a trifle more than dividend requirements.

This was impossible in 1919, owing to the sensational advance in silver prices, but the activities of 1920 were conducted strictly on these lines, with the result that net for the past twelve months will show but little more than $1,800,000 paid out in dividends. — "Boston News Bureau."

MR. GEO. S. MACKENZIE.
The Secretary of the Canadian Institute of Mining and Metallurgy

EDITORIAL

THE MINING PROFITS-TAX IN ONTARIO.

The proposal to increase the exactions of the Mining Profit-Tax in Ontario seems singularly ill-timed. The Excess Profits Tax in Britain has been abandoned, although it is very generally admitted the government in Britain needs the money that this tax brought in. The reason for abolition of a profits tax in Britain is that it has proved to be a deterrent to enlargement of business ventures, and a hindrance to new investment. A judicial decision in Ontario has clarified the meaning of the word "concentrator", but what is perhaps more urgently needed is a clarification of the meaning of the word "profits". Only the very vaguest idea of what constitutes a profit in a mining enterprise is held by many people, even by people who depend for livelihood and income upon mining ventures.

The tendency for legislators to tax mining enterprises is often traceable to the erroneous book-keeping methods pursued by mining companies, and to book entries called "profits" and "surpluses" of fictitious calculation. No calculation of profits is possible that does not take under review the entire life of a mine, and that does not plainly distinguish "profits" from the reserves required for return of capital invested, for ordinary bank interest on such capital, and for the dying days of a mining property. No "profit" accrues to any investor in a mining venture until his capital is returned. Further, any balance-sheet that shows property assets at any figure greater than breaking up value, is fictitious, and yet how many mining companies show such a balance sheet?

If the Ontario Mining Association desires to properly represent the position of those who compose its membership, and to prevent the government and the public from forming erroneous ideas on so-called "profits" it would be well advised to consult eminent actuarial authority and see that the financial statements of the mining companies are in deed and in truth representative of the financial position of these companies.

The formulation of a standard form of profit and loss statement, and of a balance-sheet of assets and liabilities, is something to be desired in Canada, and it is one in which the Ontario Mining Association, the Canadian Institute of Mining & Metallurgy and the various taxation authorities of Canada might well co-operate to secure the necessary expert actuarial and mining advice that is needed.

THE FUEL PROBLEM.

The "Atlantic Monthly" for February has an article by Arthur D. Little of New York on the fuel problem of the United States. There is really no fuel problem in that country, at least so far as available sources of supply are concerned, but there are some very urgent problems connected with distribution, problems that are not less our problems than those of our neighbours so long as the most densely-populated portions of Canada form part of the normal distribution radius of United States coal.

Mr. Little mentions that the anthracite reserve is only 190 tons per capita, a quite sufficient explanation of the increasing cost of this admirable fuel and of coming restrictions in its uses. Bituminous coal is present in the United States in reserves of inconceivable vastness, but it is far exceeded by the reserves of lignitic coals. The lignites are regarded by Mr. Little as a most valuable fuel reserve, and we have proved in Canada that by briquetting and powdering it can be made to serve all the purposes of bituminous coal in industry, and of anthracite in domestic heating.

A most striking feature in Canadian municipal development is the little use that has been made of coal gas, and Mr. Little confirms that contention often put forward in this journal that the more closely complete gasification of coal fuel is carried prior to its use as a heating medium, the more ideal is the practice. There are large areas of bituminous and lignitic coal consumption in Canada without municipal or corporate gas plants, which amounts to depriving large portions of our population of the most convenient and economical method of securing light, heat and power from coal.

Similarly, this United States authority comments on the incomplete manner in which we have applied the

selves of central electric-generating stations. "We mine, transport, and distribute nearly 700,000,000 tons of coal, when what we really want at the delivery points are heat, light and power. We ask for energy and are given a stone."

The opportunity for the "super-gas-works, and super-power-plants, high-pressure distribution of gas and common-carrier transmission lines for electric energy" is greater in Canada than it is in the United States, because our coal reserves are most unevenly distributed, and in the most acute sense the problem of providing light, heat and power in Canada is a study in transportation, or what is equivalent, a problem of power transmission.

The development of our water-powers for generation of electricity is not a rival of fuel-fed power stations. The two methods of power-generation are complementary, and both added together, plus all our peat resources, cannot overtake the fuel deficiency of Eastern Canada. Intensive, but co-ordinated development of every possible source of motive energy is desirable in Canada. The Intercolonial Railway, from Sydney to some undetermined point beyond Moncton, is an anachronism of the steam age perpetuated into what Mr. Little calls "the adolesence of electricity", inasmuch as it carries fuel for steam locomotives past four suitable locations for electric-generating stations at the coal-pit mouths. With only three-quarters of one percent of Canadian coal beds situated east of Saskatchewan it cannot be maintained that there is not urgent need for availing ourselves of every possible economy in generation of power, and it most certainly cannot be stated that there has been even an elementary attempt to modernise our practice.

CORRELATION OF COAL SEAMS BY MEANS OF SPORE EXINES.

Dr. Reinhardt Thiessen's suggestion that exact correlation of coal seams by observation of the predominance of one or more types of spore exines, opens up a very fascinating avenue of study. The distinctive character of the sculpturing and general outline of typical spore-exines that have been photographed by Dr. Thiessen to illustrate his paper, and are reproduced in this issue, are astonishing examples of the ornamentation and artistry that the Supreme Architect has expended upon the most obscure and infinitesimal things that the microscope reveals to the searcher, and one more example that Nature never exactly repeats herself. This apparently was not less true in paleozoic times than in our day.

The study of the characteristic microscopic plant remains in any given coal seam, combined with observation of the leaf impressions of the roof and floor, and with the presence of animal remains, such as small crustaceans and shellfish, should enable some very exact conclusions to be reached in regard to the stratigraphical position of the seam in question, and its correlation with other seams. Dr. Thiessen's studies form a most interesting chapter of contemporary coal literature, and indicate that extensive as the present-day knowledge of coal substance is, compared with quite recent times, only the fringe of the subject has been skirted. There remains much work, in many localities, for patient investigation and recording, but even today, it is noticeable that scientific investigation of coal substance has enabled several definite applications of the knowledge gained to economic geology and applied chemistry.

Apropos of the subject of coal-seam correlation, the "Colliery Guardian" of London urges supervision of boreholes by geological surveys. Mining engineers in Britain, and not in Britain alone, have in some instances been decidedly antagonistic towards divulging information bearing on the rocks disclosed by boreholes, but the "Colliery Guardian" believes that the trend of modern opinion is changing in this respect, and "that it is now more generally recognised that mining engineers have as much to gain from the assistance of the Geological Survey, as the last-named has from the information that a borehole may afford."

The point is well taken. Secrecy in the arts is an exploded anachronism, and one of the signs of the times that is hopeful is that a paper such as Dr. Thiessen has prepared should be available for general public use, and that it should also be available for the public of many countries, although primarily it is the result of the expenditure of public monies by one country only.

CAPITALIZING A NUISANCE.

A Boston news item stated that the Tennessee Copper Company has become less and less a copper factor since the demand for sulphuric acid expanded so rapidly, and today the copper output "may be considered as a by-product." There would appear to be distinct encouragement in this experience for the recovery of sulphuric acid from copper-nickel ores which are smelted in Ontario, especially as it is understood the sulphur content in the smelter gases is much less in the case of the Tennessee Company than is the case with the Ontario companies. Not for the first time has it happened that an addition to a plant for recovery of by-products has proved a veritable anchor in times when the demand for the main product was small and selling prices unprofitably low. The Tennessee Copper Company was, in the first instance, driven to purification of its smelter fumes by legal injunction, one of the few instances probably in history where litigation has benefitted all the parties concerned.

The low value which the Canadian Government places upon its technical officers is unfortunately merely a reflex of the uninstructed state of the public

mind as to the economic value of scientific studies. Under the existing idea of civil service remuneration by rigid classification according to seniority and position held it is quite evident that there is no possibility of any scientists of outstanding achievement remaining in the public service except during a limited period in the earlier stages of their careers. Probably a chief objection to a democratic form of government by electoral control is that it encourages mediocrity among the civil servants, and by a process of natural selection ejects those whose attainments merit special distinction. It is fortunate that there are scholastic institutions left where the aristocracy of intelligence persists and where some of the more vicious tendencies of democracy are held in check.

DR. J. A. BANCROFT APPOINTED ASSISTANT MANAGER OF THE GRANBY COMPANY At ANYOX, B.C.

It is announced that Dr. Bancroft has been granted one year's leave of absence dating from the close of the present session at McGill University, during which period he will hold the position of Assistant Manager of the Granby Company's mine at Anyox. Dr. Bancroft has been a member of the McGill Faculty for fifteen years, and holds the Dawson Chair of Geology. He has a very extended acquaintance with the economic geology of metal occurrences in British Columbia. While his Montreal friends would welcome any material advancement that might come to Dr. Bancroft in executive capacities, there would be general regret should ability in a new direction deprive the country of his services as a teacher of geology.

DR. M. Y. WILLIAMS LEAVES GEOLOGICAL SURVEY.

Dr. M. Y. Williams has been appointed Professor of Paleontology at the University of British Columbia, and his leaving Ottawa is very generally regretted, where he has not only been recognised as a distinguished member of the Survey, but has taken a lively interest in the community life. Dr. Williams is an authority on Silurian geology in Canada, and in recent years he has specialised in the economic geology of oil. He is a member of the Geological Society of America, a graduate of Queen's University and a Ph. D. of Yale. He was also President of the Professional Institute of the Civil service, to which organization he has given much time and energy.

The Ottawa "Citizen" regards Dr. William's departure from the Survey at Ottawa as another instance of the bad results of "a hastily prepared, ill-considered classification, based on inadequate remuneration". It is understood that Dr. Williams has refused offers from foreign oil corporations.

THE CEMENTATION PROCESS APPLIED TO MINING.

The Journal of the Chemical, Metallurgical & Mining Society of South Africa for November contained a paper by Dr. G. A. Voskule, describing the application of the cementation process in the construction of a dam for the Mazoe Irrigation Scheme in Southern Rhodesia. In this instance the process was used to solidify and render impervious the substrata of the foundations to support the retaining wall of the dam, and it was successful in achieving this purpose, and in avoiding an enormous amount of excavation and subsequent refilling with concrete. After some preliminary treatment to form the foundation of the dam, the construction of the dam and the cementation of the substrata were carried on simultaneously.

Twenty-five thousand cubic yards of rock were treated by cementation at a cost of eight shillings per c. yd. The cost of one cubic yard of concrete laid down was sixty shillings and a saving by use of the cementation process of £65,000 is estimated.

In the discussion that followed the reading of Dr. Voskule's paper, it was mentioned that the damage to the coal shafts in the Lens district had been repaired by cementation of the strata which had enabled the water from the upper, water-bearing strata to be quickly cut off.

Shaft sinking by the cementation process has been perfected in recent years in Europe, and has been used in the eastward extension of the Midlands Coalfield in England, which has required shaft-sinking below sea level. The François system is the one generally adopted.

TENNESSEE COPPER COMPANY PRODUCE SULPHURIC ACID AS MAIN, AND COPPER AS THE BY-PRODUCT.

A new high record was established last year by the Tennessee Copper & Chemical Co. with a sulphuric acid production of 333,629 tons, an increase of more than 50,000 tons over the best previous year.

From now on the company will make larger profits as new three-year contracts began on January 1, with more than half its yearly output being sold to the International Agricultural Corporation, American Agricultural Chemical Co. and Virginia Caroline Chemical Co.

"Capitalizing a nuisance" has been the company's experience during the past decade or more as the company was forced to commercialize its smelter fumes or be closed down by court order. Production of sulphuric acid on a large scale was the result.

The company has become less and less a copper factor since the demand for sulphuric expanded so rapidly and today the copper output may be considered as a by-product.—"Boston News Bureau."

REPORT FOR 1919, WESTERN AUSTRALIAN DEPARTMENT OF MINES.

The Report of the Department of Mines for West Australia, with its accompanying statistics is a most carefully prepared and exhaustive document. The value of the mineral output for 1919 was £3,561,201, being £701,373 less than the previous year. The greatest decrease was in gold, the chart accompanying the Report showing a continuous decrease since the record year of 1903. Gold production was valued at £3,118,113 being 87.56 per cent of the total mineral value. To the end of 1919 the total mineral production of the State is valued at £157,732,633, of which amount £140 729,627, or 95½ per cent represents gold production. Other minerals produced, in order of total value, were coal, silver, lead, tin and copper.

The Fuel Problem of the United States

By ARTHUR D. LITTLE

(Condensed from February "Atlantic Monthly.")

I

Our civilization is built on coal. It has much of coal's murkiness and grime. It has, nevertheless, developed a complex industrialism based on power, which, utilized through the agency of machines, multiplies many times the productive capacity of the individual. Whether a coal civilization is upon the whole better than the man-power civilization, which Thomas Jefferson so ardently prayed might persist in America, is perhaps more open to question than we realize; it is certainly more debatable than we admit but, for better, for worse, here it is, and it is here to stay. We have long passed the time when, as Dr. Johnson said, 'Four good wants ought to last a man a year.' The industries that we created to meet our relatively simple wants feed and develop on the new wants which they themselves create. They have thus grown, until they dominate our civilization; but, as pointed out by Gilbert, it is a curious and pathetic anomaly that the two most basic industries in the United States, food-production and the coal industry, are the most inefficiently organized of them all.

In the United States the enormous increase within our memory in the production of basic products gives spectacular testimony of the rate of our industrial growth. In 1870, we produced 1,600,000 tons of iron; in 1919, 30,000,000 tons. Our coal output, which was then 33,000,000 tons, is now approaching 700,000,000. We mined, in 1870, 28,000,000 pounds of copper; in 1919,1,289,000,000; while our per-capita consumption of petroleum, which was .016 barrels in 1860 and only .83 in 1900, has, during twenty years, jumped to three-and-a-half barrels.

These figures are significant only as one is able to visualize the ramifications of industry into which these basic products enter. The textile and paper mills, the steel works, the electrical manufactures and the diversified distribution and influence of their products, the gas-works, the automobile industry, the countless factories which pour their product into the market—to each and every one of these the fuel problem is a problem of the first magnitude; for without fuel, or its equivalent in energy, they cannot turn a wheel.

With more than half of the world's coal reserves within the area of the United States, we have permitted a situation to develop which has involved shortage at the mines, with the miners on strike or 'on vacation', famine at consuming points, embargoes, priority rulings, and the complexities and inhibitions of fuel administration by the state.

The situation is due, of course, to the converging influence of many factors, not all of which find their origin in the war. There is a noticeable shortage of men at the bituminous mines, and there is a serious shortage of coal-cars. The men work little more than half the time. They show a broad catholicity in the observance of church holy days, whether it is their own church that celebrates, or some other. With winter upon us the anthracite miners take a vacation, and this curtails output by 3,500,000 tons. Water-shipments to New England have been hampered, or interrupted, during most of the summer by labor troubles at the piers, which may have had no nearer cause than a hunger strike in Brixton prison or the failure of an archbishop to land in Ireland.

Concurrently with the gradual and general breakdown of rail-transportation services has come the building up of an enormous increase in the demand for power, which, nevertheless, is so inefficiently distributed and utilized that, in the densest industrial section of the country, the average load-factor is only 15 per cent, where it might well be 60. We may expect no cessation in the development of this demand for power, because only by rendering available to the individual worker larger and larger units of power, may we hope measurably to satisfy the insistent demands of labor.

The increased cost of coal has probably imposed an annual tax upon the American householder of not less than $600,000,000 in direct charges, and has been the cause of much acute suffering in the households of the poor. An indeterminate, but probably far greater, additional burden has resulted from higher manufacturing costs, and delayed production due to failures in coal-deliveries. The industries consume more than 30 per cent of all the coal we mine, and in many cases of bulk-production the amount of coal consumed is greater than the weight of product. A ton of paper, for example, requires for its manufacture two tons of coal. Moreover, the fuel problem bears a very direct relation to the housing problem, since great quantities of coal are required for burning lime, cement, and brick, and for smelting and working the iron and steel that enter so largely into construction. In other important industries, like the manufacture of gas and coke, calcium carbide for acetylene, and for the nitrogenous fertilizer cyanamide, as also in many metallurgical operations, coal functions as an essential raw material, which enters directly, or as coke, into the reactions of the process.

About a quarter of our total coal-production, or 153,000,000 tons, is used, and used wastefully, by our railroads. The steam locomotive, with its varying load and frequent periods of idleness, is not an efficient unit of power-generation. Moreover, about a third of the freight tonnage of the railroads consists of coal Obviously, therefore, a very pressing phase of the fuel problem is that which concerns the railroads. It can be met only by lifting the general load-factor of our industrial communities, while at the same time, wherever possible, transmitting electrical energy or distributing high-pressure gas, instead of transporting coal

Sir William Crookes, toward the close of a phenomenally long life, summed up his experience by saying, 'Whatever happens makes for progress.' If we can accept his conclusion, we may even reconcile ourselves to the present high level of coal prices, since they seem altogether likely to lead to the adoption of methods long in common practice abroad for the utilization of low-grade fuels: the far wider use of producer gas from coke, peat, lignite, and high-ash mine refuse; the expansion of the coal-gas industry with recovery of chemical values; and, finally, to the production and general use for city fuel of artificial anthracite, which permits the same recovery We commonly think first of coal in terms of its heating values, and some of us stop there. Most of us recognize that its energy values as applied to power-

development are of at least equal importance, but comparatively few realize the significance of the chemical values in coal.

Obviously, there should be a way for the home to get its fuel more cheaply, when a ton of coal, costing in 1915 about one dollar at the mine, contains about fifteen dollars' worth (at 1915 prices) of commodities useful to society. These are,—

1,400	pounds of smokeless fuel	$4.67
10,000	cubic feet of gas, at 90c.	9.00
25	pounds ammonia sulphate, at 2.8c.	.70
1½	gallons benzol, at 26c.	.39
9	gallons tar, at 2.6c.	.23
		$14.99

The way to get these values generally out of coal lies, according to Gilbert, in the development of artificial anthracite. Another way would seem to be through the establishment of great super-gas plants, and the distribution, over a considerable radius, of high-pressure gas for industrial purposes. Such distribution does not seem to lend itself to domestic heating, by reason of the enormous fluctuation in the demand, with temperature variations.

The smallness of the anthracite field, which, by the way, now contains only about 190 tons per capita, has favored a closeness of control under which effective mining methods have been developed in spite of laws opposing the means to that end. Bituminous coal, of which we have vast reserves estimated at 15,000 tons for each inhabitant of our country, fails, nevertheless, to meet its obligations, because of the competitive manner in which it is mined, the unnecessary extent to which it is transported, and the improper way in which it is used. It is a necessity, which cannot be produced advantageously under competitive operation. Integrated mining will reduce waste, stabilize production, and hold the centres of production longer than otherwise to their present spots, to the advantage of distribution; but to reduce the price to the consumer, we must change our methods of use and recover other values than mere heat value. As it is, we have a public policy hostile to combination, and no methods of storage; so that we can mine only when cars are available. The companies are scattered and unorganized, while many are small and financially weak. The price at the mine has in the past been so low that only thick seams could be worked. The industry is hampered by the restrictions of the miners, and subject to the derangements resulting from a fluctuating demand and seasonal variation.

These conclusions, which have been strikingly emphasized by Gilbert and Pogue, and many other facts and tendencies, point to a very real danger of the ultimate nationalization of coal, petroleum, and perhaps other basic resources. Such a prospect can be regarded with equanimity only when we have been able to secure a far higher level of efficiency in the conduct of public affairs. Not only must we demand vision in our public men, but we must demand a public policy based on vision and directed toward the coordinated development of the resources of our estate.

The present spectacular boom in oil; the feverish search throughout the world for new producing fields, the immediate shortage in our own supply and the impending exhaustion of our oil reserves; the new oil-burning navies and merchant fleets; the extending use of fuel oil by railroads and the industries; the enforced economy in the employment of gas-oil for carburetting water-gas; the flood of gasoline required to drive automobiles, trucks, tractors, power-boats, and aeroplanes, and its soaring price — all bear witness that the fuel problem is not confined to coal. The internal-combustion engine, by reason of its efficiency, convenience, and compactness, has brought us to the verge of another industrial revolution, which may yet prove to be as far-reaching in its effects as the one which derived so much of its impetus from coal. Already it has resulted in the development of a new and most pervasive system of transportation, dependent upon petroleum and insistent in its demand for better roads. It supports scores of new industries, drains the labor market, profoundly affects real-estate values, upsets the economy of households, and conducts its operations on such a scale of magnitude that two per cent of the American people are said to be dependent upon the activities of a single manufacturer of motor-cars.

Our aspirations for an over-seas commerce under the American flag involve the assurance of a supply of fuel oil, since four ships burning oil will do the work of five propelled by coal. Fuel oil, according to Lord Fisher, increases the strength of the British Navy 33 per cent; and, partly because of its remarkable adaptability to service, partly because of its greater efficiency, it is generally recognized as far superior to coal as fuel. It generates in practice nearly double the British thermal unit per pound consumed. None the less, its general use as fuel can be regarded only as an economic crime, in view of its other and greater potential values and the limitation of supply. Its price is bound to rise to a point prohibitive for ordinary fuel uses. In the Diesel engine its capacity for doing work is multiplied by three, and one ton of oil is equivalent in effective power to four tons of coal.

Meanwhile, the demand for fuel oil is increasing at an unprecedented rate, under the stimulus of an aggressive campaign by the oil companies, whose stocks had begun to accumulate in disconcerting volume with the termination of the war. The programme of the Shipping Board will soon require an annual supply of 60,000,000 barrels, for much of which we must depend on Mexico. Already the price has reached a point that has led the navy, in several instances, to seize supplies held at figures that it refused to pay.

More than 90 per cent of all the automobiles in the world are in the United States. It is estimated that their number in 1921 will reach 10,000,000, without including motor-trucks or tractors. We consume to-day about 120,000,000 barrels of gasoline and 7,200,000 barrels of motor-oil a year, and are called upon to concentrate a requirement of 250,000,000 barrels of gasoline, by the automobile industry alone, within fifteen years. There is small justification for the hope that we can get it. There is no general substitute in sight that promises to be available in adequate amount, although both alcohol and benzol function admirably as motor-fuel. The Geological Survey estimates that the oil resources of the country are more than 40 per cent exhausted. In 1870 we mined 5,000,000 barrels. In 1919 our production was 378,000,000. The 60 per cent reserves represent what is left in spite of our utmost endeavors to get it out. It totals something like six and a half billion barrels on which we may hope to draw at our present rate of consumption for about sixteen years. That is a short time in which to develop a substitute for 250,000,000 barrels of gasoline, even if the possibility and

means of such development were in sight. Requa foresees a demand for 900,000,000 barrels of petroleum in 1930; and it is not surprising that he regards it as a quantity which the oil territory of the United States is probably incapable of supplying.

With our domestic yield representing two thirds of the entire petroleum output, and with a consumption within the United States of one half of all petroleum values produced, it is not surprising that nations, corporations, and individuals are engaged in a desperate search for petroleum, which extends to the remotest corners of the earth. It is indeed the Day of Petroleum, but no one knows the time o' day.

Vast quantities of gasoline have in the past been allowed to escape with natural gas, the waste of which has been as high as a billion feet a day. In 1900, in West Virginia, in only two counties, over half a billion feet were lost every twenty-four hours. Several ingenious processes are now employed to recover gasoline at the casing head of gas-wells. The quantity obtained from this source was about 12,000,000 barrels in 1919. It is an important contribution, but without real bearing on the general situation; and our reserves of gas are failing.

These wastes of natural gas, which is an ideal fuel, and the losses and maladjustments which attend the orgy of petroleum production, again afford glaring examples of the need of a constructive national policy for the development of our resources. So long as ownership of portions of a common reservoir of oil is determined by vertical boundaries, each owner can hope to secure his own only by getting it before his neighbor. The result is necessarily hurried, unregulated, and wasteful production.

The hope has been held out that, as our oil reserves fail to meet the increasing demands upon them, the burden can be shifted to the vast deposits of oil-shale in the Middle West, notably in Utah, Colorado, Wyoming, and southwestern Indiana. These deposits in Colorado alone are estimated to contain not less than twenty billion tons of shale, much of which yields upon distillation a barrel of oil per ton. Much leaner shales have been profitably treated for many years in Scotland, though the industry is now said to be jeopardized by the competition of Persian and Egyptian oil. Unfortunately, the Scotch methods of operation do not seem to lend themselves to the treatment of our American shales, from which the large-scale production of oil presents industrial problems of the first magnitude. These problems are in fact so great, and so remote from solution, that no relief from shale in the near future can reasonably be expected. We shall undoubtedly some day have an oil-shale industry of vast proportions; but it is well to realize that, before it can carry the burden of responsibility now borne by oil, we must develop mining operations upon a scale at least equal to our present effort in mining coal, and must superimpose upon these operations a great transportation system, and a refinery capacity of the order of that now serving petroleum. It may well employ a million men, and its operations will build up mountain of waste beside which the anthracite culm piles will look like hillocks.

In peat and lignite we have other great reserves of fuel, as yet untouched. The peat deposits of the country are estimated at fourteen billion tons, most of which is in the eastern states along the Atlantic seaboard. New England, which is now dependent upon the delays and hazards of rail and water transportation for its fuel, is especially rich in peat, which it does not know how to use. In Boston we shivered through the rigors of last winter, and endured the hardships of a protracted coal-famine, while great beds of peat remained untouched around us. The basic problem of peat-production remains that of harvesting, which is often complicated by a mass of interweaving roots in the overburden; and there is still the difficulty, due to its colloidal character, of drying peat, which commonly contains from 80 to 90 per cent of water. Much admirable work has been done, nevertheless, in the direction of peat-utilization. On the dry basis it has rather more than half the heating power of the best coal (8500 B.t.u.), and in some instances has equaled coal in economy when burned under boilers. As amply demonstrated in Germany and Canada, it yields its best return in gas-producers, with recovery of ammonia as sulphate. With beds averaging 2 per cent in nitrogen, power-gas has been produced from peat at nominal or negligible cost.

Our supply of lignitic coals exceeds our total bituminous reserves by 33 per cent, and amounts to some 20,000 tons per capita. It is far more available at once than peat. The Bureau of Mines has shown that one ton of dry lignite yields from 8000 to 10,000 feet of gas, 17 pounds of ammonium sulphate, one gallon of oil, 50 gallons of tar, and one half to two thirds of a ton of carbon residue, convertible into briquettes approaching the value of anthracite. Lignite, when mined, has the disadvantage of powdering in the process of drying and weathering; but used as powdered coal, it undergoes very complete combustion and gives high efficiencies. For domestic and general purposes it needs only to be briquetted after carbonizing, with recovery of by-products, and is thus potentially one of our most valuable fuel reserves and one upon which we are likely soon to draw. There are, for example, great lignite deposits in Texas, which, like the whole of the Southwest, is now entirely dependent on a failing oil-supply for fuel.

A shocking proportion of the values in our fuel is now lost through preventable wastes. We have wasted more natural gas than we have used. A recent British critic estimated that indiscriminate drilling and inefficient work has resulted in the loss of over 50 per cent of our potential petroleum production. The wastes, not all of them preventable, in our mining of coal approach the same order of proportionate magnitude. The absurdly low average load-factor carried in our industries, the great excess of air commonly supplied in burning coal, and the inefficiency of the locomotive as a 24-hour power-plant, all add heavily to the burden of waste we carry.

For metallurgical purposes we coke about 80,000,000 tons of coal a year; but only half of this is coked in by-product ovens, in spite of the stimulus to their development afforded by the war. The other 40,000,000 tons are still coked in crude beehive ovens, with complete loss of gas and chemical values. Thus we still waste prodigally the ammonia required by our agriculture; tar and oils available for waterproofing, road-making, and wood-preservation benzol, toluol, aniline, anthracene, and naphtaline, the basic raw materials for dye-stuffs and explosives industries, and for countless synthetic products of widely diversified usefulness.

Anyone who has seen a great battery of boilers fired by natural gas must have been impressed by the ease and flexibility of control, the steady maintenance of steam-pressure, the absence of smoke, the cleanliness

of the equipment and surroundings, and the minimum of manual effort required for these results. This remarkable adaptability to the requirements of service makes gas an ideal fuel for most industrial and domestic purposes. Our annual consumption of natural gas is around six hundred billion cubic feet, which is probably twice the volume produced by all the gas-works and coke-ovens in the country. This includes coal-gas from the destructive distillation of coal, water-gas made by the reaction of steam on incandescent coke, and producer-gas, which is the result of the complete gasification of coal under the action of a mixture of air and steam. In our development of the gas industry we may still learn from the British, with whom coal-gas originated and who are now demonstrating the economic advantages of lower heating values. Our smaller municipal gas-plants are too often antiquated organizations, without vision, and far from realizing, either in their present practice or in their preparation for the future, the possibilities of the industry. They are, therefore, not likely to initiate, and are poorly equipped to meet the revolutionary developments which seem to be impending. They are confronted with higher manufacturing costs, due to dearer coal, labor, and money. They are being rapidly shut off from the supplies of gas-oil required for the enrichment of the relatively cheap water-gas. A forced return to coal-gas seems inevitable, if present standards of quality are to be maintained, though the immediate tendency is toward combination processes involving the complete gasification of the coal. Meanwhile, a general advance in rates is in effect.

Looking to the future, there is obvious need of a more flexible method of manufacture and a wider range of products. The utilization of the gas itself is still relatively undeveloped, but the gas-engine, the new methods of surface-combustion, the range and convenience of high-pressure gas, and many other factors, point to a great expansion in the industrial use of gas. Similarly, the progress made in the low-temperature distillation of coal and the remarkable results already attained point to the ultimate city gas-plant as one designed to receive the raw coal required by the community, and to produce therefrom gas, artificial anthracite, oils, motor-fuels, and alcohol from ethylene, concurrently with the recovery of the benzol, tar, and ammonia now lost when the community burns raw coal. In fact, coal is the only resource in sight available in sufficient quantity to serve as raw material on which to base a method for the production of fuel-oils and motor-fuel in quantities adequate to meet the ultimate demand. It devolves upon chemistry to develop such a method, and, when developed, the place for the method is in the gas-works. Very significantly, the yields of oils obtainable from coal by carbonization have almost doubled since 1918.

But the gas-works are not alone involved in the impending revolution in our use of fuel. Powdered coal combines many of the advantages of gas with many of those of oil. It is highly efficient, easily controlled, and, perhaps best of all, permits the effective use of low-grade coals, culm, and lignite. A more recent development is colloidal fuel, composed of an emulsion of powdered coal and fuel-oil. The usual proportions are 40 per cent coal, 59 per cent oil, and one per cent of a "fixateur" to ensure the stability of the emulsion. Colloidal fuel remains in the liquid state, can be stored and pumped like oil, and burned in the usual oil-burners. Its chief present importance lies in the fact that it conserves and extends the supply of fuel-oil.

III

We sometimes call the period in which we are living the Age of Electricity, whereas it is really the adolescence of electricity. We mine, transport, and distribute nearly 700,000,000 tons of coal, when what we really want at the delivery points are heat and light and power. We ask for energy and are given a stone. The transportation of energy and its delivery to our homes and factories and along our railroad lines have just begun. In its extension on a scale vastly greater than anything we have known lies the hope of solving our fuel problem. We have come to the day of super-gas-works and super-power-plants, high-pressure distribution of gas, and common-carrier transmission lines for electric energy.

Electricity has already become the most effective servant in the house. At the turning of a button, it floods our rooms with light; it is not above doing a little cooking; it runs the vacuum cleaner, the sewing-machine, the dumb waiter, and the pianola. It heats the curling tongs and the flatiron, and may even be persuaded to replace the iceman at the refrigerator door. It is a prompt and willing messenger. The farmer who, in response to the revolt of mother, installs an electric pump, soon finds that mother's labor at the old pump-handle was worth only one half-cent an hour. Some indication of what these integrated services cost in power may be found in a recent order for one million electric washing-machines, each of one kilowatt capacity. A million kilowatts is interesting to any central-station manager.

The well-recognized relation of water power to fuel is expressed in the popular phrase, 'white coal'. The present production of hydro-electric power in the United States is roughly equivalent to 40,000,000 tons of coal; whereas nearly ten times that amount is used in the generation of steam power and carbo-electric power. In densely populated districts as much as one quarter of the coal-fired power is often devoted to the generation of electricity. Generally speaking, however, our public electrical utilities even now probably consume not more than 7 per cent of our total output of coal. The large unit applications of electricity to the industries are, nevertheless, rapidly extending. These applications involve not only the turning of wheels. More and more generally are great installations being devoted to the processes of electro-chemistry and electro-metallurgy, to the production of bleaches and alkali, carbide and acetylene, fertilizer, abrasives, aluminum, magnesium, special steels, and other basic products of the decomposing cell and the electric furnace. We have hardly begun to make electric steel, but the world already devotes some nine hundred million kilowatt hours of energy to its production.

The results obtained through the complete or partial electrification of a few of our railroads have amply demonstrated that the electric locomotive, in every variety of railroad service, does its work always as well as, and in most cases better than, the steam locomotive, while the latter as a prime generator of power is of course hopelessly behind the great turbo-electric generator.

These converging factors, which are quite general in their bearing, have already developed in England a strong trend toward the concentration of fuel consumption in super power plants as a step toward the ultimate electrification of British industry. In our own coun-

try the reaction to the obvious necessities of the situation has taken on an even more definite and concrete form in the stupendous plan for the creation of a super-power zone, extending provisionally from Washington to Boston, and inland from 100 to 150 miles. As a necessary preliminary to the realization of the plan, Congress in July authorized and provided for the conduct of the Super-power Survey, which is now being made by a special engineering staff under the inspiring leadership of W. S. Murray, and the general direction of the United States Geological Survey. Although the super-power zone includes only 2 per cent of the land area of the country, there is concentrated within it 47 per cent of our industrial activities. It contains an estimated machine capacity of 17,000,000 horsepower, of which 10,000,000 is employed for industrial purposes and the remainder utilized by the railroads. In a word, the super-power plan provides a means of lifting the average load-factor, which now within the zone does not exceed 15 per cent, to a load-factor of more than 50 per cent, and possibly as much at 60 per cent. It proposes to make one ton of coal do the work now done by two, and to relieve the railroads of transporting one half the amount of coal required for power and lighting purposes. It expects to increase the value of the machine capacity within the zone from threefold to fourfold, and to save not less than 30,000 000 tons of coal a year, worth, even at $5 a ton, $150,000,000. The reduced cost of maintenance of machinery and the reduction of train-miles through consolidation of trains will, it is believed, save another $150,000,000, making the total annual saving $300,000,000, or 24 per cent of the estimated cost of installation. The plan offers immediate relief from the present intolerable congestion of the railroads within the zone, by automatically increasing rail capacity without extending track mileage.

The present economy of power-production within the Boston-Washington zone will average at least 40 pounds of steam per kilowatt hour. In the contemplated super-power-plants of 300,000 to 500,000 kilowatts capacity, located near the mines and along the coast, not more than 15 pounds, and it may well be as little as 10 pounds of steam, with a total consumption of one and a half pounds of good coal per kilowatt-hour output, should be required.

These super-power-stations, together with all efficient generating units within the zone, and all available water-power, will be linked together and pour their output of high-tension current into the common-carrier transmission line from which both the railroads and the industries will draw their primary power.

This super-power plan may well be regarded as the first step in that co-ordination of our resources, and their development under a comprehensive general plan, which I have long advocated, and from its successful operation still greater things may reasonably be anticipated. Thrift has been defined by Roosevelt as 'common sense in spending'. We need sadly to develop a national common sense, and to apply it to the spending of our natural resources, which are the basis of our national wealth. More than ever before is the whole world under a heavy responsibility to use its resources wisely; and the major portion of that burden falls upon us who are the most richly endowed of all. We are beginning vaguely to recognize the urge of the hoarding instinct, which, according to Gilbert, marks the dawning of economic consciousness in the progress of civilization. We must learn to hoard until we can learn to use. We must substitute coordinated development by planning for opportunist development designed primarily for the enrichment of the individual. We have only to contemplate the situation into which opportunist development has brought us, as regards our coal, our oil, our gas, our water-power, our transportation systems, and our forests, to realize that most of the wastes, delays, and difficulties which characterize the situation are due simply to lack of planning years in advance, and to our failure to embody in a coordinated general plan those lines of action which are well recognized by experts as vitally essential to our proper development as an industrial nation.

NOVA SCOTIA COAL MINING NOTES.

The collieries of the Nova Scotia Steel & Coal Company produced in January 53,500 tons, comparing with 52,256 tons in January 1920 and with 62,372 tons in December. The lower output in January was caused by idleness at the collieries enforced by lack of outlet. The new colliery, No. 7, produced 439 tons.

The collieries of the Dominion Coal Company in the Glace Bay district produced during January 256,473 tons, comparing with 285,021 tons in December and 275,129 tons in January 1920. Enforced idleness at the collieries due to lack of outlet accounts for the smaller production.

All the Nova Scotian collieries have signed the wage agreement with the United Mine Workers. This was based upon negotiations at Montreal between the U. M. W. and leading operators, and has been acquiesced in by the smaller mines, in some cases under pressure of circumstances.

A. D. Matheson, who has been Manager of Dominion No. 4 Colliery has been appointed an Inspector of Mines for the Coal Company, and his place as Manager has been taken by J. R. Dinn, for a good many years Underground Manager of this mine. Alex. K. Hay, formerly City Engineer of Sydney, has been appointed Assistant Mining Engineer of the Dominion Coal Company.

The export trade to Europe is virtually dead, and the outlet for the production of the collieries in Nova Scotia is now limited to local uses, and a very small consumption at the steel plants, where operations are on a very reduced scale. As much coal as is considered advisable is being banked out, and an early opening of navigation is hoped for that will permit of coal being sent to St. Lawrence ports in quantity larger than since 1915.

ASBESTOS NOTES.

Asbestos Mines, Ltd., owners of the one time Boston Mine at East Broughton, Quebec, has increased the capacity of the mill from 4000 to 800 tons a day. It is stated to be the largest asbestos mill in Canada.

It is reported that the Quebec Asbestos Corporation of East Broughton, has purchased the adjoining property of the Asbestos Fibre Mining Company.

Asbestos Mines Limited has awarded a contract for an aerial ropeway to the American Steel & Wire Company. The aerial will have a capacity of delivering 1,000 tons of rock a day from the pit to the mill. The refuse from the mill will also be handled by the aerial.

The Asbestos & Mineral Corporation of New York announce the occupation of new quarters on the Gotham Bank Building, 1819, Broadway.

Recent Developments in the Microscopic Study of Coal

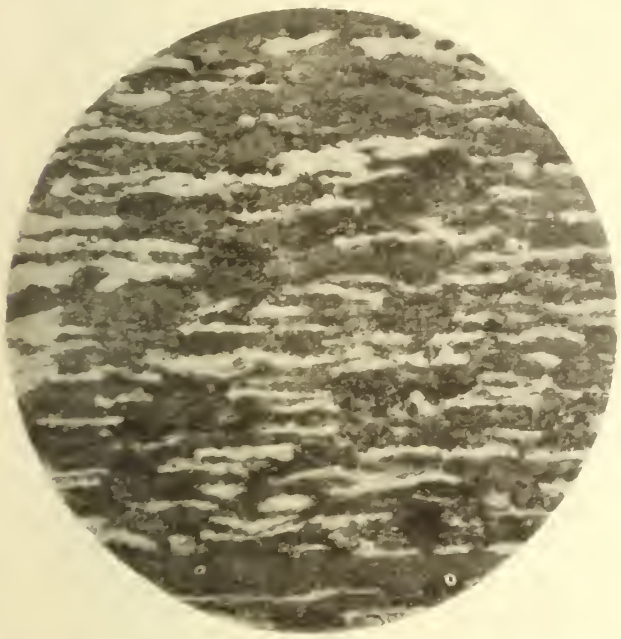
By REINHARDT THIESSEN. *

(Paper given before the Coal Mining Institute of America, Pittsburgh, December 9th, 1920.)

(Continued from Page 91 issue of Feb. 4th, 1921.)

SPORES IN COAL.

On account of their beautiful colors and brilliant appearance under the microscope, the spores were the first objects discovered in coal. Since their discovery, they have often formed the objects of the main discussion on investigations of coal, while the main subject to be discussed was only slightly mentioned or left out altogether. More prominence and



7.—Thin section of Pittsburgh coal more highly magnified to show the character of the spore-exines and other constituents in detail. Magnification 1000.

more importance has therefore been put on them than they deserve. It must, however, not be construed that they do not form important constituents in the coals.

The spores and pollen grains are only found in the attritus of coals, usually mixed with the other constituents (Photographs 5, 6, 7, 8, 9, 10, 11, 12, 13, 14, 18, 19.) Here and there they are found in mats. Frequently they are in lumps still held together the way they grew in the plant. Before it was known what they really were various names were given to such lumps. Occasionally whole cones of the coal forming plants remained in the coal with all the spores intact.

The spore content of coal may vary greatly in the same bed from place to place, from top to bottom and also from seam to seam. When spores form a considerable part or a large proportion of a coal bed or a part of a layer of coal bed, it lends distinctive characters to it.

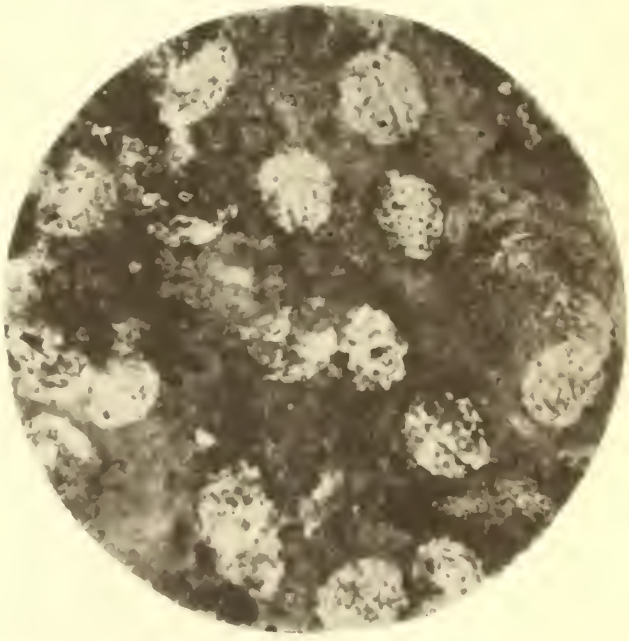
The important part of the spores in coal formation are their outer walls or exines. The inner or living parts were soon destroyed in the peat stage. But the outer walls or exines are very resistent to bacterial activities and chemical reagents and have thus escaped decay and disintegration to a large extent. In this respect the spore exines of all the spore bearing plants are alike, as are also the exines of pollen grains of the seed plants. In the living plants they are composed chiefly of oils, waxes, fatty acids, alcohols, some resinous matters and cellulose. Langer found in the spores of a club moss, for example, 49.3 per cent oil. Besides this they contained philosterine, benzol derivatives, an acid called pollin, and cutin.

Horn Coal and Cannel Coal.

When the attritus forms a considerably thick layer in a seam, say half an inch or an inch or more in thickness, and is composed largely of spores it is called horn coal (Photograph 30). When such a layer is still thicker so that it forms a considerable part of the bank or forms a bed by itself, it is called cannel coal. In other words, cannel coal is an attritus in which spore matter forms the predominant part. Some cannel coals contain little else than spore matter. They are then called boghead coals. Others have varying amounts of other plant degradation-matter present. The ash content is usually high in them. There is no real distinction between cannel coal, boghead coal, torbanite and torbane mineral. By far the largest part of the organic matter in all of them consist of spores.

Bone Coal.

When a layer of attritus occurs in a seam that is rich in mineral matter or ash together with spores and other organic matter and is of such thickness as to be fairly well noticeable, it is called bone coal:



8.—Horizontal section of Pittsburgh coal at a high magnification to show the broad side characters of spore exines and other constituents in detail. Magnification 1000.

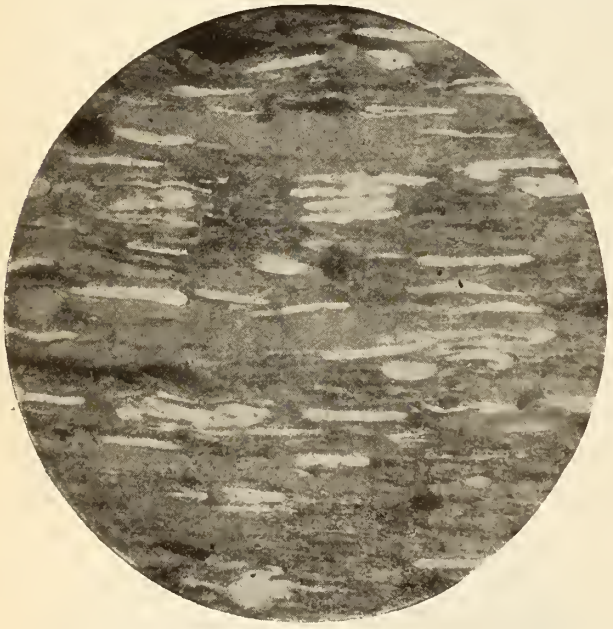
when it is composed very largely of mineral matter, it becomes shale.

Oil Shale or Carbonaceous Shale.

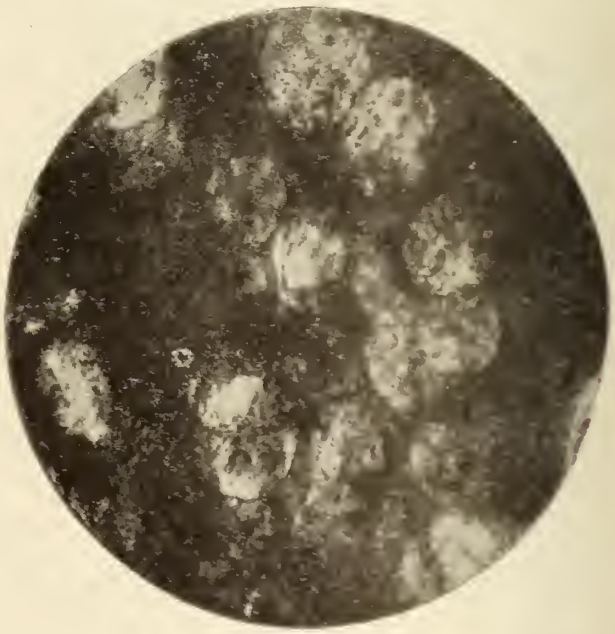
When a layer of attritus in a coal is rich in clay or where clay is a predominant constituent together with organic matter, it is called carbonaceous shale (Photographs 7, 28, 29). Such shales often form beds by themselves and are occasionally of considerable

thickness and extent. They are found all over the world and are generally called black or carbonaceous shales. When such deposits or rocks are rich enough in organic matter, so that when subjected to distillation, they yield oils, they are called oil-shales. Microscopic examination shows that the oil does not exist in the shale as such, but is generated from the organic residue or attritus in the shale when heated. Because the organic remains yield oil on distillation, they are now generally called "kerogens", from the Greek "keros" meaning wax, and "genesis", to be born. The kerogens, however, are nothing more or less than the remaining parts of plants, residues of plant matter, or plant degradation-matters. Spore remains form the most predominant part of the organic matter of many. In the oil shales of the Devonian from Illinois, Indiana, Kentucky, Ohio and Tennessee, the organic matter consists almost entirely of the remains of spores, very intimately mixed with a fine clay (Photographs 27, 28, 29). More or less pyritic matter and a few sand grains are also distributed through the mass (Photographs 27, 28 and 29). The spores are of the ordinary fern type prevalent in the coals of the Carboniferous Age, and present the same general appearance.

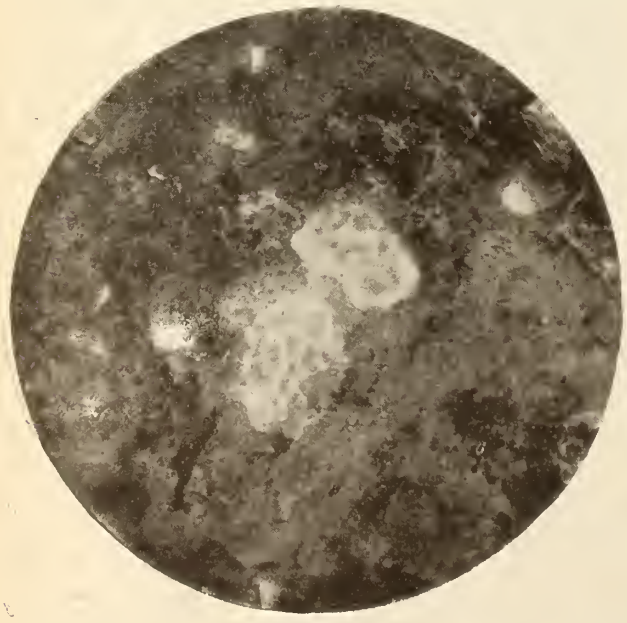
The deposits were evidently formed over a very large area, which must have been a plane with very poor drainage and for the most time covered with a shallow sheet of water. The basin was the habitat of aquatic and semi-aquatic plants related to the coal-forming plants of the Carboniferous. As is the case of such habitats at present, the main plant-parts decayed and disappeared very largely, while the most resistant parts, the spore-walls, remained, and together



10.—Part of a thin section of the same at a higher magnification, showing the constituents in detail. Notice the smooth outline of the spore-exines. Magnification 1000.



11.—Horizontal section of Upper Freeport coal, to show the nature of spores on their broad side. Magnification 1000.



13.—Part of a thin horizontal section of Lower Freeport coal, including characteristic spores at a high magnification. 1000.

14.—Part of thin vertical section of Lower Freeport coal, showing characteristic spore-exines in cross section. Magnification 1000.

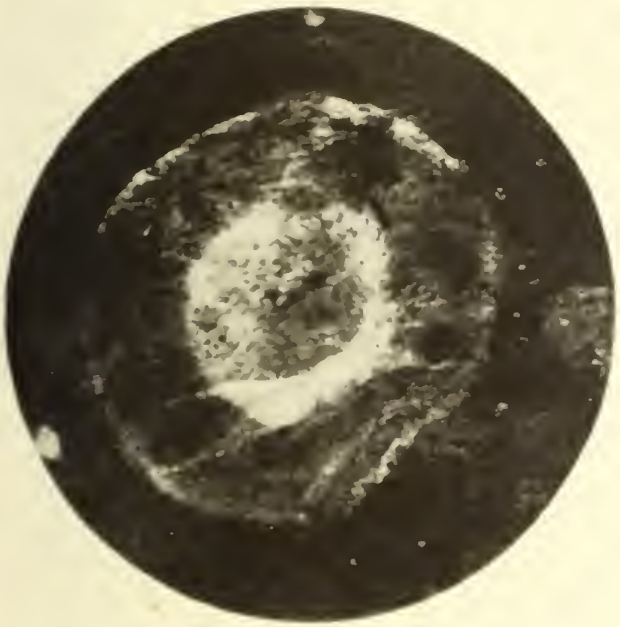
with the mineral matter of the plants, and that carried in by wind and perhaps water, formed the deposit. It is probable that spores form the larger part of the organic matter of all oil shales and that the spores are the source of the oils distilled from them.

CORRELATION OF COAL SEAMS BY MEANS OF THEIR SPORE EXINES.

The spore-exines have very definite and clearly defined characteristics, such as form, size and surface sculpturing (Photographs 7, 8, 10, 11, 13, 14, 15, 16, 17, 18, 19, 20, 21, 22, 23, 24.) Different genera and perhaps different species are different in sculpturing, size, thickness of wall and form. By means of these differences, they can be readily distinguished from one another. These spore characters have been so well preserved in almost all coals that the spores of one kind of plants can be clearly distinguished from those of another kind. In examining the spore-exines of some seams, it is found that by far the largest bulk of the spore-exines of that seam are of the same kind. In other seams, two kinds, while in others, three kinds of exines may form the main bulk. In comparing the predominating exines of one seam with that of another, it is not difficult to see that those of one bed are different in some way from those of any other.

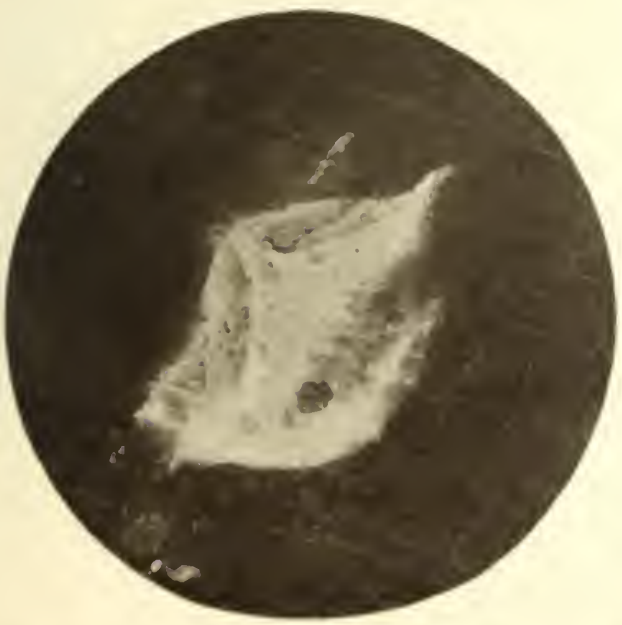
Occasionally a spore-exine will be found in a given coal seam that differs materially from those found in other seams but does not predominate. This spore-exine may be a distinguishing characteristic of the coal seam in question, but is not the predominant one.

Although not nearly all coal seams have been exam-

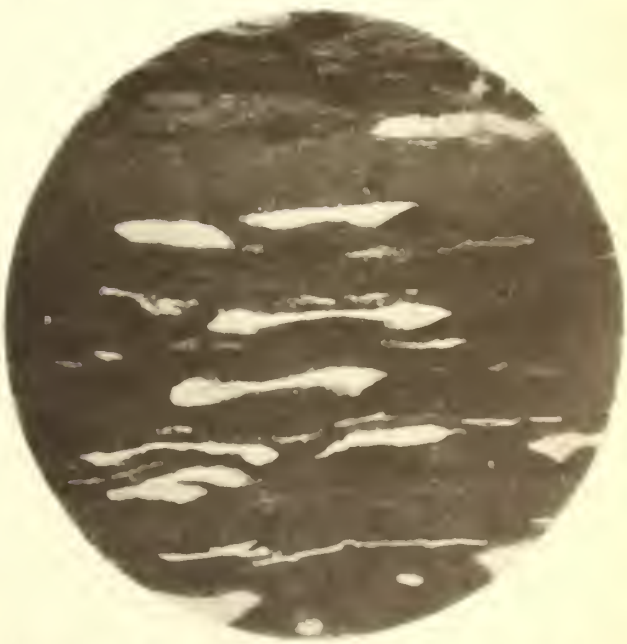


15.—Part of horizontal section of Brookville coal including ring type of spore-exine. Magnification 1000.

17.—Part of horizontal section of Brookville coal including spore-exine with spines. Magnification 1000.



18.—Part of horizontal section of Brookville coal including spore-exine with peculiar processes. Magnification 1000.



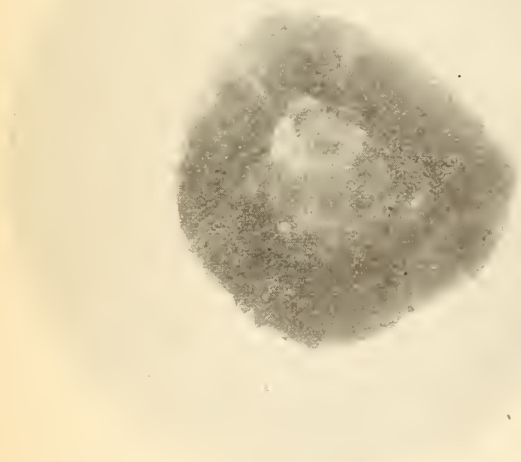
19.—Part of [illegible] vertical section of Yoakum coal showing characteristic spore-exines and other constituents of coal. Magnification 1000.

ined in this respect, there are sufficient grounds for the broad statement, that as far as they have been examined, each coal seam contains one or more kinds of spore-exines that are predominant and characteristic, or if not predominant, characteristic of that seam. By this means many seams may be distinguished from any other. A few examples as illustrations will be given:

The Pittsburgh (Photograph 6, 7, 8) seam contains a type of spore-exine that is at once predominant and characteristic, that is, a large majority of the spores are of the same kind and found in no other seam. It is a small spore, only 15 microns across the disk (photograph 7) and relatively thin. The outer surface, when highly magnified, has very much the appearance of the outer form of a brain (photograph 8). In cross section, it has a corrugated appearance due to this sculpturing. By means of this sculpturing the spore may be distinguished very easily from all other spores. Since no other coal contains this spore, the Pittsburgh seam may be readily identified by means of it.

The Upper Freeport contains a smooth and somewhat larger spore that predominates. (Photographs 9, 10, 11.) It also contains in small numbers a much larger, thick-walled spore sculptured with coarse ridges. This same spore is the predominant spore in the Lower Freeport. (Photograph 12, 13, 14.) The predominant smooth-walled spore of the Upper Freeport appears to become one of the minor spores of the Lower Freeport. These two coals need considerably more study in order to make positive statements concerning them. There is as yet no telling whether the one or the other may not become the predominant spore of the same seam, until more type samples have been examined.

The Brookville seam has three kinds of spore-exines.



20.—One of thespores of the Yagger coal seen on the broad side. Magnification 1000.

21— Broad side view of a spore exine from a coal from Buxton, Iowa. Magnification 1000.

22.—Part of thin cross section of Buxton coal, showing the same spore-exine in cross section. Magnification 1000.

23.—Broad-side view of megaspore-exines of the Buxton coal. These spore-exines in the coal have each three long delicate wings or air sacks, but these were broken in recovering them from the coal. Magnification 30

all predominant (photographs 5, 15, 16, 17); that is, the three kinds form the largest bulk of the spore matter; and each one is so decidedly different from the other and from those of any other seam that either one offers a ready means of identification. The different spores may be distinguished quite well at a magnification of 200 diameters. Their specific characters are, however, much better brought out at a magnification of 1,000 diameters. The most peculiar

24—Cross section of the same kind of spore-exine shown in Photograph 23, showing one of its three wings in cross section. Magnification 100.

one is a rather large exine with very peculiar processes giving it a very odd shape in cross sections. In horizontal sections (photograph 16), this spore-exine presents different appearances, all according to how it lies and how it was cut, yet no matter how located and how cut they all present a somewhat similar appearance.

A second type is studded with rather large echinate spines (photograph 17). It is between 45 and 60 microns, or in the neighborhood of 1-500 of an inch in diameter. A third kind of spore-exine in horizontal section reminds one of Saturn and its rings (photograph 15). It is a large thin-walled exine with a thicker central part, the spore proper, surrounded by a much thinner outer zone forming a wing to the whole. The total diameter of the disks is between 80 and 90 microns, or close to 1-250 of an inch.

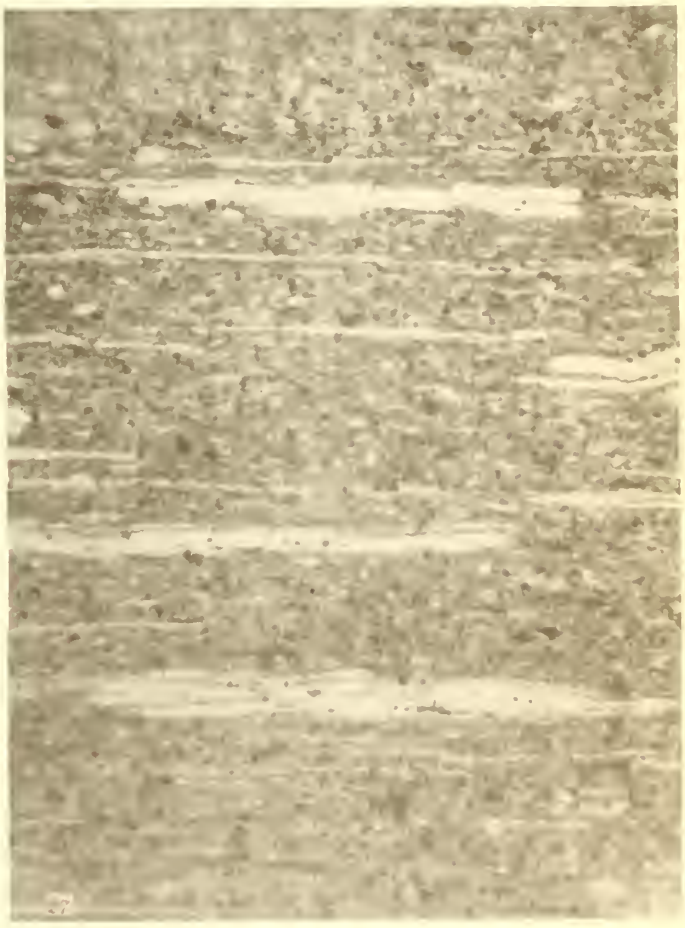
A fourth spore exine is found quite abundantly in this coal. It is rather small and in many ways is similar to the one predominating exine in the Upper Freeport.

A number of other coal seams in Pennsylvania and in Kentucky, Alabama, Illinois and Iowa, have been examined. Each one has been shown to contain spore-exines as characteristic as those shown. By this means any of the coals could be identified, some at first sight, others after more careful study. A spore, for example, in the coal from the Black Creek Bed in Alabama has such decided characteristics, both as seen in cross section and in horizontal section, that it can easily be recognized without mistake wherever found. (Photographs 18, 19, 20.) This identical spore-exine is found in "C" or Kellioko bed of Kentucky. This at once raises the question whether the Kellioko bed of Kentucky and the Bank Creek bed of Alabama represent the same coal seam or not.

The predominating spore-exine of the Yagger bed in Alabama is also of such a shape and appearance that it can be distinguished readily from any other. As seen in cross section, it is a broad, thin-walled exine with a smooth surface. In no other coal seam have spore exines been found resembling this one.

A bed at Buxton, Iowa, contains two spore-exines either of which is decidedly different from any other spore-exine yet found. At first sight, the one appears very similar to that one of the Black Creek bed in Alabama, but at close inspection and when seen on the flat side, a very marked difference is shown. (Photographs 21, 22.) The other is the exine of a megaspore with three large air sacks or wings. (Photographs 23, 24.)

A number of other spore-exines could be shown every one of which having characters as specific and as different from any other as those shown, but enough



examples have been given to show how full of possibilities this line of study on the correlation of coal seams is. In cases where one or a few exines would fail to warrant a safe correlation, more could be studied. In the percentages of each very many different fossil plants are often required to determine a correct stratigraphic position. The same method could be followed for a proper correlation of coal seams.

(To be continued.)

Northern Ontario Letter

THE SILVER MINES.

The Cobalt District.

A proposal to increase the Mining Profit-Tax in the province of Ontario has aroused quite general and united opposition in the mining districts . The Ontario Minister of Mines proposes to increase the tax from a former rate of 3 p.c. on the first million earned, and 5 p.c. on all amounts exceeding that figure, and make a 4 p.c. rate apply on the first million with 7 p.c. on everything above a million. The representative of the "Canadian Mining Journal" has been delegated authority to speak through the "Journal" for the mining industry of the entire Province. One of the chief point to be emphasized is this:

The Serious Truth.

At the great silver-producing area of Cobalt, only a few mines are now able to work at a profit. More than a dozen properties have closed on account of being unable to continue work under the present burdens, Where 2,200 to 2,300 men found employment a year ago, the total does not exceed 900 at present. Additional burdens in the form of an increased tax might precipitate a serious crisis in the silver-mining industry.

Canada and Mexico are now rivals in the bid for capital, with which to speedily develop enormous mineral wealth. A special decree was passed a few days ago in Mexico, removing duty entirely from silver when quoted below 60 cents an ounce. The duty is to apply only on a sliding scale above that figure. To increase the tax in Ontario would place this province under an added handicap.

The United States is encouraging silver mining by paying American producers 99½ cents an ounce for their silver. Resolutions drafted in mining districts of British Columbia are urging the Dominion Government to fix the price of silver at a minimum of 80 cents an ounce. In the face of all this evidence, which goes to show how difficult is the position of the silver miners, the Ontario Government is endeavoring to add yet another burden and thus increase the discouragement which has already slowed down the industry to an alarming degree in this province.

The workers in the mines see in the proposed tax increase, the possibility of the mining companies having to seek some way to offset the added cost, which may affect employment and wages.

Drifting operations at the 410-ft. level of the Chambers-Ferland mine have reached a point where the vein being followed is expected to join a larger vein which comes onto the property across the boundary of the Nipissing. This vein carried high grade ore across about two inches at the point where worked on the Nipissing.

Among the new favorable developments taking place in the Cobalt field, the veins on the Bailey as well as the University continue to attract attention. The mill. rock accompanying the veins carries silver in sufficient quantity to make it profitable to mine even with silver quoted at a low figure. The high-grade shoots of ore encountered from time to time along these veins make them doubly important.

The January statement sent out with the dividend and bonus paid by the Nipissing shows the treasury of the company to be in a strong condition. Cash in bank, including Canadian War Bonds and investments amounted to $3,422,201 as of January 3rd. The value of ore bullion in transit, on hand and in process at the mine and mill and buillion ready for shipment was estimated at $1,488,809, thus making a total of $4,921,-010. The dividend and bonus paid amounted to $600,-000 and was distributed among approximately 13,000 shareholders. The company has 1,200,000 shares issued, and it follows that the average held by each individual amounts to only about 92 shares. The frank policy of the company in keeping its shareholders advised each month as to progress made, has made a favorite of the Nipissing.

Annual statements soon due from the mining companies of the Cobalt district will show a considerable decline in ore reserves. This is due in part to the labor shortage during the first nine months of the year 1920, and a power shortage during the last quarter. It is also due to a considerable extent to the slump in the price of silver. This decline has relegated a large amount of mineralized rock to the waste heap, in that it could be handled profitably only with silver selling at a reasonably high figure. Large blocks of ground may now have to be eliminated from the estimates. The McKinley-Darragh is expected to show a very large decline of upwards of 25 per cent.

The O'Brien mine of the M. J. O'Brien, Ltd., is maintaining its position satisfactorily and is one of the largest individual employers of labor in the Cobalt district. The present pay-roll includes about 170 men. The Nipissing which is the largest employer has a total of approximately 270.

Elk Lake and Gowganda.

The sleigh-road from the railhead at Elk Lake to Gowganda is in excellent condition and quite large quantities of supplies are being transported over the road for use during the coming summer. Considerable new activity is being planned in spite of the low price of silver, and the tendency is to proceed with work on the strength of the belief that conditions within the reasonably near future will settle down to something like what prevailed at the time of the outbreak of the recent war.

Exploration work is proceeding quietly on the property of the White Reserve Mining Company, at Maple Mountain.

A sheriff's sale of the goods and chattels of the Mapes Johnson Mining Company, Ltd., as well as the Brant Mines, Ltd., will be held in Haileybury on Feb. 10th.

The annual statement issued by the Crown Reserve Mining Company, for the year 1920 shows that the company lost $72,054 during the period. The surplus was reduced to $512,481. This is equal, however, to about 25 2-3 cents a share. No dividends were received during the year from the Porcupine Crown Mines which is controlled by the Crown Reserve.

During the week ended Feb. 4th, the Dominion Reduction was the only company shipping ore from the Cobalt district. This company sent out two cars containing an aggregate of approximately 171,000 pounds.

THE GOLD MINES.

The Porcupine Field.

In all sections of the Porcupine gold area, there are continued signs of increased activity on various mining prospects of promising merit. The success being met

with on the proven mines, and the general belief that the gold-mining industry is on the verge of a very prosperous era combines to offer added inducement to the owners of such properties.

Announcement has just been made to the "Journal" that the old Standard property, known in the early days as the Standard mine, and later as the Premier, is to be operated aggressively by the Premier Paymaster, a new company incorporated for that purpose. The company has an authorized capital of 2,500,000 shares of the par value of $1 each, and financial arrangements have been completed so as to commence work within the next few weeks. It is the company's intentions to sink a shaft to a depth of 500 feet, with lateral operations at each 100-ft. level. Former work on the property opened up an encouraging amount of ore. The No. 1 shaft was driven to a depth of 216 feet, while the No. 2 shaft was sunk to 100 feet and connected up at that depth with No. 1. About 800 feet of underground work was done, one mineralized zone about 50 feet in width being cut. The property is equipped with a mining plant, consisting of two 80 h.p. boilers, a compressor and hoist. A good set of camp-buildings are already on the property. A S. Fuller, of Porcupine, is vice-president and manager. The property lies about half a mile southwest from the Dome Mines.

A new company, known as the Porcupine Associated Goldfields has been incorporated for the purpose of taking over the Three Nations, La Palm, Dominion Porcupine and Jermey Veteran claim, all situated in a group in the north-eastern part of the township of Whitney. The total area comprises about 720 acres. The new company has an authorized capital of 5,000,000 shares of the par value of $1 each. It is understood a substantial block of the stock is being underwritten by English interests who propose to sell the stock at par in the Old Country. In regard to the organization, the Three Nations stockholders (the original) will not participate owing to that company having previously gone into liquidation. The La Palm shareholders, it is understood, will be allotted one of the new shares for each two held in the La Palm. Previous work on the properties, particularly the Three Nations, was quite encouraging. A shaft was sunk 260 feet and a limited amount of lateral work done. On the La Palm, the amount of work was quite limited, but showings at surface were quite promising. The strike of the veins on the Porcupine-Keora property which lies a short way to the West is in the general direction of the northern part of the merged properties.

Highly favorable results continue on the Dome Mines. A large amount of high-grade ore has been encountered at the 1,050 level and the size of the deposits lends color to the belief that the average grade of the ore to be treated at this mine will gradually increase and may ultimately approach in richness that heretofore treated on the Hollinger Consolidated. Beginning with April, the scope of work on the Dome, as well as milling operations will undergo a steady increase and the entire operation will be brought up to full capacity at as early a date as possible.

In regard to the proposal of the Ontario Minister of Mines to increase the Mining Profit Tax as applied to the silver, and gold mines, the operators of gold properties have openly expressed the opinion that such a step would be exceedingly unwise at this time. They point to the fact that a large amount of capital is required with which to develop the many promising properties, and that every effort should be made to encourage development. Later on, when the industry becomes more firmly established, taxation could be borne with greater ease. The opinion is that added taxation at present might dwarf the industry in its infancy and result in less revenue to the province than were taxation modified at present with a view toward heavier taxes at some later date. The views of the mining interests are to be presented to the Ontario Government, and every effort will be made to induce the Government to hold any such measure in abeyance for another year at least.

Among the properties which are likely to resume work during the coming spring is the Gold Reef. Former work on this property resulted in the recovery of encouraging quantities of high-grade gold ore. This was taken out by miners who worked the property under lease. Plans are being made to sink a shaft to a depth of 300 feet at which point diamond drilling formerly indicated the presence of a strong vein.

Kirkland Lake Area.

During the month of December, according to a report just issued by R. C. Coffey, manager, the Lake Shore Mine treated 1,865 tons of ore and recovered $34,670.49. The average grade of the ore for the month was $18.48 per ton, and an average of a little over 60 tons of ore were treated daily. It is the intention of the company to instal additional crushing equipment so as to increase the capacity to about 100 or 120 tons daily. The cyanide equipment is already adequate to handle such an increased tonnage. The main shaft in the Lake Shore has been deepened to the 600-ft. level, and crosscutting is under way toward the rich No. 2 vein which lies under the lake.

Henry Cecil, well-known mining man, particularly in the Kirkland Lake district, is stated to be taking legal action against Conrad Latilla, and H. Sedgewick, both of London, England, as well as against the Kirkland Lake Proprietary, (1919) for the purpose of enforcing the terms of a partnership agreement alleged to exist between Cecil, Jorgensen and Sedgewick, under date of Feb. 26th, 1913. Mr. Cecil is endeavoring to restrain trading in the Kirkland Lake Proprietary until settlement of his alleged claim of one-third of the profits arising as a result of the partnership agreement referred to.

The annual meeting of the Tough-Oakes Gold Mines has been called for Feb. 10th, at which time it is understood the directorate elected will be representative of the Kirkland Lake Proprietary (1919) which controls the merged properties of the Tough-Oakes Gold Mines, Burnside Gold Mines, Aladin Cobalt, and Sudbury Syndicate.

The annual meeting of the Sylvanite Gold Mines will be held on the same date as the meeting of the Tough-Oakes. An effort is being made to include the Sylvanite in the general consolidation. It is believed the Buffalo interests who hold a minority of the Sylvanite stock may join in the scheme.

At a depth of about 85 feet on the Hunton Kirkland property, an encouraging amount of visible gold has been encountered. Average assays have not yet been made, but from the appearance of the ore it will run high.

Larder Lake District.

A petition is being circulated among heavy shareholders of the Goldfields, Ltd., of Larder Lake, for signatures to a request to Premier Drury to order an investigation into the affairs of the Company and the actions of its officers. Already upwards of a score of names have been placed on the petition, representing between 150,000 and 200,000 shares.

Reports about the Associated Goldfields, which is negotiating for control of Goldfields Ltd., have been very contradietory, and the Mines Department is understood to be prepared to institute an examination proved the request comes directly from the shareholders of the Company.

TORONTO MINING STOCK QUOTATIONS.

Quotations on Active Stocks on Standard Stock Exchange Quotations for Week Ending 5th February, 1921.

Silver.	High.	Low.	Last.
Adanac Silver Mines, Ltd	2⅛	1½	2
Bailey	3¾	3½	3¾
Beaver Consolidated	39	35½	38½
Chambers-Ferland	6	6	6
Coniagas	2.00	1.95	2.00
Crown Reserve	18	16	16
Gifford	1¼	1⅛	1⅛
Great Northern	2	2	2
Hargraves	2½	2	2
La Rose	32½	30	30
McKin.-Dar.-Savage	30	28	30
Mining Corp. of Can.	1.10	.95	1.05
Nipissing	9.00	8.65	9.00
Ophir	1¾	1¾	1¾
Peterson Lake	10½	9	9
Temiscaming	25	25	25
Trethewey	19½	17	17½
Gold.			
Apex	2¼	2	2¼
Atlas	25	21½	23½
Dome Extension	46	45	46
Dome Lake	3¼	3¼	3½
Dome Mines	14.50	14.00	14.50
Gold Reef	3¼	3⅛	3¼
Hollinger Cons.	6.75	6.45	6.68
Hunton Kirkl'd G.M.	11	8	10¼
Inspiration	3½	3½	3½
Keora	26¾	22¾	25
Kirkland Lake	51	49½	51
Lake Shore M. Ltd	1.23	1.20	1.21
McIntyre	1.88	1.85	1.87
Newray Mines, Ltd	6	5	5
Porcupine Crown	22	20½	21
Porcupine Tisdale	½	½	½
Porcupine V.N.T.	22¼	21	21
Schumacher	25¾	25	25
Teck-Hughes	11½	10¼	10¼
Thompson Krist	7¼	6⅞	7¼
West Dome	10	9	9
West Tree Mines Ltd	5½	5	5
Oils.			
Ajax Oil	28	22	28
Petrol Oil, The	35	34	34
Rockwood Oil, Gas	2¾	2¾	2¾
Vacuum G.	16	14	15½

TORONTO COAL PRICES.

Toronto, Feb. 9.—According to local coal dealers at least fifty per cent of the coal being sold in this market is being disposed of at below the cost of production. Business is extremely dull. Slack coal is selling in Toronto all the way from $6.25 to $8.00 a ton according to quality. Lump coal is any where from $7.50 to $8.50 and smokeless is selling from $8.00 to $9.00 with little or no market.

TORONTO METAL QUOTATIONS.

	February 9th.
Copper, electro	18
Copper, casting	17¾
Tin	43
Lead	7
Zinc	8
Aluminum	32
Antimony	8

MONTREAL METAL QUOTATIONS

Following are fair average prices for ingot metals (in less than car-load lots) at Montreal:

	Cents per pound 3rd Feb.	Feb. 9th.
Copper, electro	17½	18½
Copper, castings	17¼	18¼
Tin	36½	38
Lead	6½	6½
Zinc	7	7¼
Aluminum	34	34
Antimony	7½	7¼

THE LATE HARRY D. SYMMES

Mr. Harry D. Symmes, who was widely known in oil, gas and mining circles in Ontario, died at his home in Niagara Falls, Ont., on Dec. 31st at the age of 51 years.

After his graduation from Trinity College School, Port Hope, he entered the University of Toronto, where he was graduated from the School of Practical Science in 1891. He was a member of the Zeta Psi Fraternity of the University, and a member of the Canadian Institute of Mining Engineers.

Mr. Symmes was the Manager of the first electric railroad in Canada. Early in the practice of his profession he was a contractor of the Hydro Power Development of the Ontario Power Company at Niagara Falls and later constructed several water power plants in Northern Ontario. In mining he was connected for many years with the Cobalt and Porcupine Camps having been a director of the McIntyre Porcupine mines and the Temiskaming Mining Company for several years. At the time of his death he was a director of a number of oil and gas and mining companies. He was the principal promoter of and personally financed the Volcanic Oil & Gas Company and Glenwood Natural Gas Company, two of the largest and most successful gas companies in Ontario. He was also prominent in political circles, and a member of the Anglican church.

Mr. H. C. Crow of the Canada Metal Company, Toronto, and head of the Cartwright Goldfields, Limited, is about to leave on a month's trip to the Pacific Coast on a visit to the Canada Metal Company's branches. He will spend a little time at Winnipeg and Vancouver.

British Columbia Letter

THE METAL MINES.

Stewart, B.C.—The Premier Gold Mining Company is shipping ore over the winter trail from its property on Salmon River to the town of Stewart, at tide water, at the rate of about 500 tons a fortnight. The snow has packed on the road and two caterpillar tractors are proving serviceable. On each trip they draw four sleighs loaded on the up-trip with machinery for the new Mill and on the down with ore. The survey of the proposed aerial tramway from the Mine to the Coast and reported to have been completed and the work will proceed as soon as the directors approve the expenditure. An exceedingly rich pocket is said to have been found in the mine workings, the contents giving returns of gold running from $5 to $10 a pound.

Action brought by Maurice W. Bacon against R. K. Neill, one of these interested in the Premier Mine, for the recovery of a one quarter interest in the property has been dismissed by Federal Judge E. H. Rudkins, in the courts at Spokane, Wash. The latter in his judgment states that the plaintiff in two cases has influenced witnesses and had lacked good faith in not bringing the suit in 1917 when he first knew of Neill's operations instead of waiting until the mine had proved of worth.

Patrick Daly, of Nelson, B.C., is suing R. K. Neill, R. W. Trite, A. B. Trite and W. R. Wilson, all of whom are interested in the Premier Mine, for a one-fifth interest in the same. He alleges that Neill entered into an agreement with him to finance the development of the property and to give him the share he is asking for. This undertaking, he asserts, was approved by the other defendants when they became partners.

Ashcroft, B.C.—A large quantity of hydraulic placer-mining machinery is being moved from Bullion and Horsefly Properties, Cariboo, B.C., by R. T. Ward, who recently sold these claims after successfully asserting his title, and that of his associates, in a legal battle with John Hopp, which was carried to the Privy Council, England. The claims are said to have changed hands at a considerable figure and the nature of future operations is such that the long disused equipment is not required. It, therefore, has been disposed of separately in Vancouver.

Trail, B.C.—Ore receipts at the Trail Smelter of the Consolidated Mining & Smelting Co. from the 7th to the 14th insts., inclusive, totalled 6,890 tons, making the aggregate for the year to that date 13,148 tons. Among the independent shippers were the Paradise, Windermere; the Horn Silver, Similkameen; the North Star, Kimberly; and the Velvet, Rossland.

Nelson, B.C.—The Columbia section of the American Institute of Mining Engineers, whose membership is taken from the northwestern states, will hold sessions next Summer at Nelson and Trail, the date to be arranged to coincide with those of the International Mining Convention to be held at Nelson. It is likely that these joint gatherings will take place sometime in June. S. G. Blaylock, General Manager of the Canadian Consolidated Mining & Smelting Co., has promised his cordial co-operation in the endeavor to give the visitors the opportunity to see all of interest to them and to make them feel the warmth of genuine western Canadian hospitality.

Vancouver, B.C.—S. Silverman, President of the Alaska B. C. Mineral Corporation, recently visited the Sidney Inlet Copper Company's property on the west coast of Vancouver Island. Owing to the low price offering for copper, and by reason of the fact that the Tacoma Smelter is not inclined at present to accept copper shipments, no doubt because, if reports are correct, it has some 26,000,000 pounds on hand, the Sidney Inlet Mine has been shut down. There is a small crew engaged in diamond drilling but outside of this development work operations have ceased. It is expected, however, that the Mill will be re-opened in the Spring.

THE COLLIERIES.

An inquiry into the reasons for the high cost of coal to the consumer in British Columbia, where there is produced annually between two and one-half and two and three-quarters of a million tons, is demanded by the citizens of the City of Vancouver. The agitation does not appear to be of the usual ephemeral character. At a mass meeting called to discuss the situation, a large crowd was addressed by Mrs. Ralph Smith, member of the Legislative Assembly, who is reported to be likely to receive a call to the executive of the Provincial Government, and other prominent person. The upshot was the unanimous passage of a resolution calling upon the Government to take such action as is necessary to disclose the reason why coal, mined sixty or seventy miles from Vancouver, should cost the people of that City about $15.00 a ton delivered to their homes. The Mining Bureau of the Vancouver Board of Trade is understood to have undertaken to make an investigation and there is a well grounded belief that the Government will take official cognizance of the discontent of the consumers.

A section of the Press has been diligent in the collection and publication of information as to mining and delivery costs. How much reliance can be placed on figures so assembled and circulated, of course, is a question and it does not seem that reliable knowledge is yet available regarding the financial situation of the mine operators and the coal dealers. The statement that Vancouver Island coal may be bought cheaper in the City of Seattle than in Vancouver, for instance, scarcely appears to be borne out by the facts because the quotations ordinarily given are prices in the dealers' bunkers and there are to be added delivery charges, which vary in proportion to the distance of the particular residence from the centre of the city. Other assertions have been made with which those concerned in the production and the distribution of the fuel disagree so that it is improbable that the air will be cleared until the Government, or some public body, probes the companies' affairs as well as those of the dealers and publishes the results. Certainly that would appear to be the only avenue open either to force down an unjust exaction for one of the necessities of life, or to wipe out the public's impression that the consumer is being villainously robbed by soulless profiteers.

The Premier of the Province and the Minister of Mines are to meet a committee of Vancouver citizens in a few days to discuss the matter and it is possible that the outcome will be the instituting of a public inquiry.

Not alone are the residents of the Coast Cities of British Columbia concerned over the price of fuel. There is deep feeling in the Kootenays on the same question as is manifested by a resolution recently passed by the Nelson Board of Trade for submission to the approaching convention of the Associated Boards of Trade. The latter body will be asked by the Nelson organization to endorse a request addressed to the Dominion Government for the undertaking, through that government's fuel controller in this Province and in Alberta, of a thorough investigation of the cost of coal and coke. It also is to be urged that the aforementioned controller be empowered to investigate the cost of living in coal towns and that a public representative be appointed to participate in the inquiry.

Several reports are in circulation regarding the development of new coal areas on Vancouver Island, B.C. One is that 50,000 acres of coal land situated on the Island has been acquired by American interests for $1,750,000. It would appear, however, that the deal has not been finally closed, its issue depending upon the results of exploration, prospecting, and some drilling now in progress under the supervision of engineers. W. S. Henderson, president of the Gem Coal Mine Co. and Jewel Collieries of the Drumheller area, Province of Alberta, has been on the Pacific Coast recently and it is stated that he is making investigation with a view to taking over British Columbia coal lands. John Arbuthnot, of Victoria, with whom he spent some time, holds promising coal-rights near Nanaimo. It is believed that development will disclose coal in commercial quantity on Reid, Thetis, Kuper and Wallace Islands, situated in the vicinity of Portier Pass, Gulf of Georgia.

The value of coal bunkers to a sea port is a subject prominently before the three chief Canadian Pacific-Coast cities at present. Prince Rupert, the most northerly railway terminal has taken the lead. Bunkers are to be constructed at that port and the enterprizing citizens are being backed both by the Dominion Government and the Canadian National Railways. Victoria has extensive docking facilities recently completed that, thus far, have been used scarcely at all. The Board of Trade of that City believes that coal bunkers at the ocean docks would bring mercantile business and Victoria, therefore, is stepping in behind Prince Rupert. Public opinion in both communities is strongly behind the enterprise. To Prince Rupert, situated hundreds of miles from the coal mines of Vancouver Island and of Alberta, extensive and modern fuel storage accommodation will be invaluable. For Victoria, placed almost within stone's throw both of the Island mines and of the channel of North Pacific oriental shipping, bunkers would be a business-getter, bringing needed fuel within convenient reach of coal-burning vessels. Vancouver, always a trade rival of the provincial capital, and likewise a port and in point of volume of business the most important Canadian centre of the Coast, also is in line for bunkers, so that it may be said that western Canadians are awakening to the vital importance of coal, not only in a strictly limited industrial sense, but as the propelling force in trade.

The Fraser Lake Collieries Ltd. has been incorporated in British Columbia with a capitalization of $600,000, its headquarters being in Prince Rupert. This Company has been formed to develop and operate coal property situated near Fraser Lake in northern British Columbia. The coal, which is said to be of good quality, giving satisfaction both as a domestic fuel and for steaming purposes, is so close to the surface that a steam shovel may be used in its recovery. This method was adopted last year on a small scale and is to be continued this year.

The British Columbia Coal & Land Co. is another new British Columbia coal-mining concern. It has purchased the holdings of the Cassiar Coal Co., situated on the Telkwa River, consisting of 20,480 acres. This, too, is a first-class fuel, although the reports available indicate that it is not a coking coal.

The Morden Mine of the Pacific Coast Coal Mines Ltd., Vancouver Island, still is non-productive. It is understood that some form of company re-organization is in progress and that there is a prospect that not only will the mine mentioned be re-opened, but extensive development of the Company's Island holdings will be commenced in the near future. Meanwhile there are quite a number of miners in the Nanaimo section out of employment.

A Montreal Letter

ALEX. GRAY.

Gold Producers Only are Serene.

With the purchasing power of gold increasing—and all other metal markets "without money and without price," as the saying goes, those producing the yellow metal have a serenity that is all their own. They have been "patient in long-suffering". When other metals were at their peak, gold mining was out of it because of reasons too well known to require recapitulation. Now, and notwithstanding the gold standard is more or less weakened by the necessities of debtor nations, the metal is not subjected to the vagaries of international trade which is approaching a goods basis rather than being maintained on a strictly gold basis. Labor and supplies are in process of readjustment; gold mining is not so vicarious, whereas silver seems to be without a friend among those who represent the market for it. London and New York have banged the white metal until the price is almost prohibitive to mining advocates of economy; governments which disregard intrinsic worth and will have it that subsidiary coins are mere "tokens"; metal dealers who probably are "short," make it appear as though silver was more than ever a non-essential—at least until the Orient recovers its economic equilibrium.

As for copper, zinc and lead: I quote one whose business it is to know the metals position. "It might as well be admitted that there is not enough money to make copper under present conditions—and there is not enough money in Europe to pay for what copper can be produced on short notice. The idea of pooling 400,000,000 lbs. of copper and carrying it by issuing debentures, while minimizing operations, I suppose is the only remedy. Europe cannot pay cash for enough copper to invite great activity. At 13c. the company able to make copper is the exception. Therefore, the only thing to do is to stop production until working conditions are upon bed rock. Half way measures cannot accomplish the desired objective. What is true of copper is more so with regard to zinc. We have a new British zinc and lead combination to contend with. If the Burma and Broken Hill Corporations, acting with

others through this latest Associated Lead Manufacturers combine, accomplish their purpose, Canadian producers of zinc and lead will have to bestir themselves. The Anaconda Company will cease producing zinc. They have been buying zinc from other producers. These latter also will suspend operations. I know another very large zinc company is not content to operate at a loss. New Jersey zinc earnings in the quarter ended December 31, were cut in half. So, I maintain, there is nothing to it but to practically shut down."

Chinese selling, and lack of support are given as the reasons for the break in silver. The Indian bazaars had given the cue to the market for the metal the price dropped to the point where producers in general will feel the pinch.

PORT ARTHUR NOTES.

By J. J. O'CONNOR.

Present indications point to active gold mining development in North Western Ontario at an early date.

The Dryden district is forging to the front with excellent prospects of entering the producing class during the current year. With intelligent methods of development, and the efficient means for the recovery of the metal values in the ores, now being adopted, it is confidently predicted that it cannot fail to make good, as a prosperous gold camp

Mr. C. P. Charlebois has arrived in the city with a $2,300 gold brick, from the St. Anthony Mine, at Sturgeon Lake. This brick was the result of a five-day mill run of the waste dumps and tailings of former mill operations.

The mill went into commission on August 20th, 1920, operating solely on tailings, and material formerly wasted. Since that date, Mr. Charlebois has Mint certificates to show that $16,483.40 has been produced and marketed from this class of material. The ore is high-grade, running about $19 to the ton. Up to the present, no ore has been raised from underground. The mill has been put in first class condition, and has a capacity of 200 tons daily. Since it was started in August last it has been treating about 70 tons daily.

Underground mining has now been commenced, and the mill started early in February, on this ore, which has an average value in the present workings of $22.00 per ton.

The mine has been completely unwatered to the fourth level, has been carefully sampled and checked throughout the entire workings, and shows an average value of $10.50 per ton of ore in sight.

The ore blocked out has been carefully measured, and assayed, separately in each level, showing a total of $800,000. Added to this there are concentrates, and ore on the dump that will bring the total value of ore in sight up to $1,250,000.

Dr. W. L. Goodwin concluded a most successful two weeks term of Prospectors' Classes on the 4th instant. There was an average attendance of 25 prospectors, while the public were well represented at the lectures delivered on geology and mineralogy, in the City Hall, by Dr Goodwin. The Board of Trade tendered a complimentary luncheon to Prof Goodwin, in the Prince Arthur Hotel, in recognition of his services to the pioneers of mining in this district

THE MALAGASH SALT DEPOSIT, CUMBERLAND CO., N. S.

Memoir 21 of the Canadian Geological Survey, recently issued, is a report on the Malagash Salt Deposit in Cumberland County, Nova Scotia, by Dr. A. O. Hayes, together with a review of the literature describing salt springs in Nova Scotia and New Brunswick, the location of which is shown upon an index map included in the Report. The deposit has been previously described by L. Heber Cole and Dr. Hayes in reports of the Survey, and in this journal.*

The following is the summary of Dr. Hayes's conclusions, excerpted from the Report. The analogy drawn between the Malagash occurrence and the Strassfurt deposits in Saxony is most suggestive.

Summary of Conclusions.

The Malagash salt is a deposit formed by the evaporation of sea water during a recession of the Mississippian sea in Windsor time.

Mining development has demonstrated the presence of a sufficient quantity of salt for the establishment of an important industry, and the market is now supplied by run of mine salt from a bed 4 feet thick, an average sample from which contained 98 per cent sodium chloride. A bed of clean crystalline salt 21 feet 6 inches thick has been encountered in a boring by a diamond drill at the face of the underground workings. Sixty feet thickness of salt strata measured at right angles to the dip has been cut by a shaft and level, all of which can be utilized for the manufacture of refined salts or other sodium compounds. As only about one-tenth of the ground underlain by brine has been crossed in the Malagash mine workings, the outlook for a much thicker body of salt is good.

Potassium chloride occurs in a lenticular deposit in the form of crystalline masses of pink and yellowish green sylvite in a matrix of halite. A potash zone has been penetrated at two points 30 feet apart, varying in thickness from a few inches to 5 feet. The potash content is variable, dependent on the concentration of sylvite which is probably of secondary origin.

In the shaft near the top of the salt bed a 4-foot seam, with an analysis of 1.16 potash was encountered, and, in the face of the drift, about 30 feet lower stratigraphically, a much richer potash zone was exposed. In one place, a full shot from the face ran 8.73 per cent potash.

The salt strata are probably offset by faults at certain localities, but the regularity of the structure along the coast to the north, for a distance of about three-quarters of a mile, suggests that the salt may extend without serious interruption for an equal distance along the strike, and the sedimentary character of the salt points to a continuation in depth, parallel to the dip of the enclosing rocks.

The occurrence at many localities in Nova Scotia and New Brunswick of salt springs issuing from rocks of the same geological age, suggests that other deposits of a similar nature occur in the vicinity of these springs. The salt strata are similar in origin to the extensive Strassfurt deposits in southern Saxony, in which large accumulations of potash-bearing sediments occur. The presence of small quantities of potash at Malagash and in the brines from springs elsewhere indicates that, possibly, potash in commercial quantities may also occur in the Maritime Provinces.

The establishment of a salt and allied chemical industry should receive careful consideration as the favourable location of Malagash with respect to the supply of raw materials and fuel and its exceptional advantages for transportation either by rail or water offer an opportunity for successful competition in both domestic and foreign markets.

The Report states that as the result of a reconnaissance of the district from Hillsborough to Hampton, N.B., lying between the Kennebecasis and Hammond rivers, made by Dr. Hayes and W. J. Wright of the Survey in September 1919, the conclusion was reached that the Windsor series is more extensive than previously reported. It is suggested by the facts observed that the rocks between Elgin and St. John, N.B., formerly correlated with the Albert series, belong to the Windsor, which lies unconformably above the Albert.

*See issue of 8th January 1918, pp. 8, 9. Malagash Salt Deposit, by L. H. Cole.

NEW MINE RESCUE PHONE IN ENGLAND.

A new mine rescue telephone has been brought out in England to fulfill requirements of the British mining acts, which prescribe that rescue telephones must be part of the equipment of a rescue outfit and that they must be metal cased.

The new telephone outfit is constructed of cast aluminum, and is of the magneto type, made easily portable and compact, and is fitted with induction coil, two dry cells, powerful magneto generator and buzzer. It has a combination transmitter and receiver of a short pattern, which clips into a cast aluminum hinged cover on top of the case, which fastens with a strong spring. The cover also protects the generator handle. The hand combination is connected by a metallic fexible cable, which coils in the cover when not in use, and the case is provided with a strong leather carrying strap. The line cable is connected by means of a twin connecting plug. Cable of especially strong construction is unreeled from a cable reel on a special stand at the top of the mine, and is so connected that conversation with the person down in the mine with the phone can be carried on even when the person below is moving and unreeling more cable.

CLAYS & SHALES OF VIRGINIA, U.S.A.

Bulletin No. xx, Virginia Geological Survey, is a report on the clays and shales of Virginia, West of the Blue Ridge, by Professors Ries and Somers. In addition to full descriptions of the clay and shale deposits and working clay-plants, the report contains useful general information on clays and the tests to be applied to prove economic value for specified uses. Prof. Ries is a well-known authority on the economic geology and general technology of clays and shales. The clays found in this part of Virginia, which is in Appalachian Mountains territory are stated to be suitable for common and pressed brick, drain-tile, hollow blocks, fire brick, electric porcelain, earthenware, paper, paint, etc. Office of issue is the University of Virgina, Charlotteville

EDITORIAL

GOLD AT DEPTH IN NORTHERN ONTARIO.

Elsewhere in this issue will be found a summarisation of the information given to the shareholders of the Hollinger Consolidated Gold Mines, Ltd. While the Hollinger Mines is the darling of the North, and may seem to the uninitiated to be a too oft-quoted exemplar of what is and what may be typical of Northern Ontario, the 1920 Report provides ample justification for the sentiment in the gold camps of the North.

A feature of the gold occurrences of Northern Ontario that is becoming increasingly impressive is the persistence and even improvement of gold-bearing ore at great depths. This is true of the Hollinger, Dome and McIntyre Porcupine mines in the Porcupine District, and is also being disclosed at the Kirkland Lake District mines and at Boston Creek.

Emerging from the wealth of geological data that has been collected, and the actual proving of the gold-bearing rocks by mine development, there is also, we venture to suggest, a glimmering of the connected origin of gold occurrences that have been found, in the first instances by a series of intelligent accidents and guesses, and in later instances by following a line of search suggested by geological deductions. The schematic arrangement of the gold-bearing rocks—if this phrase is permissible in connection with repeated igneous flows—is beginning to be apprehended, and the cumulative value of a multitude of detached and apparently unrelated observations is about to be applied in Northern Ontario, with possibly most valuable economic results. It may be suggested that [illegible] persistence of gold bearing rocks to great depths is indicated by actual tests at moderate depths in the instances referred to.

While surface gold occurrences are often very rich and approaching the spectacular in character they do not offer the hope of permanence that deep-seated deposits hold out. At the same time deep-seated deposits call for large expenditures of capital and require intelligent and far-sighted planning. There are a number of mines in Northern Ontario, notably the Hollinger, McIntyre and Dome trilogy, where these essential conditions have been fulfilled, and the confidence in the future of the camps that is observable in the newspapers and in correspondence from Northern Ontario seems fairly warranted.

THE VALUE OF THE RETURNED-SOLDIER GRADUATE.

The "Canadian Mining Journal" is especially pleased to put before its readers the letter in this issue from Mr. J. D. Mackenzie of Vancouver which pleads eloquently the claim for preferential consideration in the matter of employment of returned-soldier graduates of our technical universities.

If discipline of mind and body, hard knocks in war and a large measure of disillusion in peace, experience in human nature, and the real achievement of resuming and completing interrupted studies after their war experiences, are to be regarded as meriting recognition — as they are traditionally so regarded — the returned-soldier graduate should be eminently fitted for responsible positions in industry by personal qualifications. These men would be the last to request consideration on any other grounds than their own capabilities, and Mr MacKenzie rightly regards the coming release of returned soldiers from their studies as affording a real opportunity to employers to obtain men of unusual merit. In this connection may be mentioned the excellent work that has been done by the Canadian Institute of Mining and Metallurgy, through the Employment Bureau of the "Bulletin" in putting returned engineers in touch with mining companies having vacancies in their staffs. This work is still being carried on.

MONTREAL, INSTEAD OF OTTAWA, FOR C. I. M. & M. MEETING.

After due consideration, the President and Council of the Canadian Institute of Mining and Metallurgy have decided to hold the Annual Meeting, March 2nd to 4th inclusive, at the Windsor Hotel, Montreal, instead of at Ottawa. The change is rendered neces-

ary by the smallpox quarantine against persons leaving Ottawa for eastern points. While it is believed the epidemic at Ottawa has been given undue prominence, there is a likelihood that the holding of the meeting in Ottawa may tend to reduce the number in attendance.

The necessity for a change of meeting place is regrettable, as the Ottawa Branch has been very active in preparation for the meeting there. Naturally, they are disappointed, but they have been willing to do what was deemed best for the Institute as a whole, and the Council has been required to act at short notice to the best of its judgment.

The co-operation of the eastern members to make the Montreal meeting successful is therefore most desirable, as it means that much of the work which was already accomplished by the Ottawa Branch will require to be duplicated in readiness for the unexpected meeting in Montreal.

As some consolation for the Ottawa members it may be stated that Montreal is not without its compensations, and that enconiums have been passed upon the cheerful character of Montreal gatherings by the highest authority.

OIL PROPAGANDA.

The virulence of the oil propaganda increases, and as this "Journal" pointed out about a year ago, there is growing danger that the paid propagandists of large oil interests may drift into "propagandists of hate" between friendly and allied nations. The mere suggestion that the world's peace might be again endangered, which recently emanated from London and was magnified into an international incident without the slightest warrant, nevertheless sent an icy chill to the hearts of a world sick of the lunacy of war and not unforgetful of that awful hetacomb of men who died that wars might cease. Such talk is not only preposterous, as Secretary Colby said, but it is the lunacy of Hell.

There is a further consideration that the conflict of rival oil interests is based on misconception of the future of oil. Neither the permanence of oil supply, nor the permanence of the use of oil is assured to the world. The hottest controversy is being carried on in Britain — and quite openly through the columns of the "Times" — as to the relative importance of the capital ship, the submarine and the air-fighting machine. Sir Percy Scott has prepounded a conundrum; "What is the use of a battleship?" a question that is about as answerable as queries on the value of a dollar or the name of the gentleman who gets the exchange differential. It is presumed by authorities, who should know, that the fighting machine driven by oil is supreme in sea, and sky, and under the sea. This question we may leave to these learned gentlemen. It is likely to be their funeral in any case.

It is further presumed that the only source of motor fuel is petroleum. This belief is, however, nothing more than an assumption. There is the best reason to believe that coal is the substance that will provide the motor-spirit of the future. The presence or absence of coal in a country is a demonstrable fact. The presence or absence of petroleum is a more or less intelligent guess — a good deal more intelligent than it used to be admittedly — but nevertheless largely a guess.

The whole nasty business of oil propaganda is based first on selfishness, and secondly on assumptions. The public understands neither the source of the propaganda, or the misconceptions of fact and ingenious inaccuracies with which it is sedulously fed, a very fruitful source of mischief, as the world ought to know by this time.

Some provocative statements are being circulated as to the financial control by corporations of extra-national oilfields. What possible significance has that? Is not the sovereign power of any nation over its own national resources admitted, and cannot it do what it likes with its own? If not, then the world is little else than a congerie of bandits, and the fight of the Allies for the delivery of Belgium was based on error.

It is desirable that business interests of any or all nationalities should not attempt to prostitute patriotic feeling to the furtherance of commercial profit. This is the molecule of truth in the belief of certain political groups that Capital caused the war of 1914, and it is inevitable that any nation which permits such procedure by private corporations will reap as grim a whirlwind as those who lately followed this same perilous path are reaping at this time.

THE STONE TRADES IN CANADA.

The meeting of men concerned with the crushed-stone, and stone-cutting trades in Toronto last week calls attention to a branch of the mineral industry in Canada which has a bright future. Road-building, of a permanent character, and the substitution of non-inflammable structural materials in the construction of buildings, are two very good signs of a progressive civilization, and they offer the widest scope for growth.

Although the Geological Survey has published excellent monographs on the building stones, the road-building materials, and the clay and cement possibilities of Canada, there has not been that growth — particularly in the East — in the use of these structural materials that our stores of such materials would have permitted had not the tradition of using timber in dwelling and other construction persisted too long. In this regard, the cities of Ontario and the West are much in advance of eastern cities. Toronto, in particular has an admirable building tradition, and the manner in which the western provinces have provided themselves with permanent and artistic public buildings is most striking to visitors from the East. The

kaloids and others. While some of these are present in the plants in only small proportions, like the glucosides, phytosterines and others, a number are present in considerable amounts like the resins, fats and waxes.

Many of those plant products that occur in small amounts belong to the aromatic or ring-compounds and their derivatives, and for that reason are of great significance. Hydrocarbon compounds that contain either a single or compound benzol ring are very stable. Oxidizing reagents, for example, will not attack the benzol ring, but any hydrocarbon of the paraffin group attached to the benzol ring as an end group or side chain is readily changed or removed. Compounds with a group of closed rings, that is, compounds with the naphtalene, anthracene or phenanthrene nucleus and their derivatives, show the same behavior. These compounds are waste products of plant assimilation, that is, they are not food stuffs and are therefore thrown off. Because they are not food stuffs, they are not usually attacked by organisms like bacteria and fungi. Fr this reason many of the plant products that occur in but small quantities in the plants, like benzols, the phenols, chinones, aromatic alcohols, ketones, and alcehydes and their derivatives, terpenes, camphors, and phytosterines, alkaloids and others that may have remained in the coal-rorming debris, may have accumulated or concentrated, as is known to be so in the case of resins, and thus are found in considerable amounts in coal as revealed in coal distillation.

In peat, the presence of many of the ring compounds found in plants may be shown by means of microchemical tests. In the lignites, some of them can still be detected. In the bituminous coals, however, none can be detected by such means, but when they are subject to distillation, many of these compounds and their derivatives appear in the distillates. During the whole process of the transformation of plant substances into coal, there is a gradual loss of oxygen. More correctly there was a loss of carbon, hydrogen and oxygen, but there was a relatively greater loss of oxygen than of carbon and hydrogen. This is what the geologists call deoxygenation. What other changes have taken place in the organic compounds besides the loss of oxygen is not exactly known. It may be polymerization, dehydrogenation, or both. That dehydrogenation takes place in some cases is certain. An example of this is found in Retene, a fossil resin found in peat, lignite and in fossil conifers. It is a hydrocarbon having three rings with only one hydrogen atom attached to each free carbon atom. It may be derived from the two constituents of rosin, abietinic acid and pimaric acid, by distillation, as has been shown by Vesterberg and Tshireh, and it is therefore related to these. But abietinic and pimaric acids have two hydrogen atoms attached to each free carbon atom instead of one. There has been not only a removal of the oxygen but also a removal of one of each of the two hydrogen atoms attached to the carbon atoms in the change from the resin acids to retene. Chemists call the dehydrogenation. Fichtelite* is another fossil resin, also found in peat lignite and fossil wood and sometimes associated with retene, and is also supposed to be derived from either abietinic acid and pimaric acid. But in this case, each side group containing oxygen has been replaced by two hydrogen atoms, and in every place where retene has one hydrogen atom attached to a carbon atom, fichtelite has two. Fichtelite is among the most stable organic compounds known. Amber and succinite are also fossil-resins with a similar history. These examples are given to convey an idea as to what probably has happened to the many well-known compounds which are contained in plants.

What was said concerning the aromatic or ring compounds and their derivatives is true also to some extent of the aliphatic or chain compounds and their derivatives, although these are not as stable as the ring compounds. It should be emphasized that the aliphatic compounds constitute by far the largest part of the plant substance. The cellulose, gums oils, fats, starch, alcohols, proteins, sugars, and acids belong here. Their radical or nucleus is a paraffin chain to which are attached various end groups, containing oxygen, that make them what they are. Some of the plant substances, like starch, sugar and protein, may decompose readily, but not without leaving some of the decomposition products behind. Others, like fats, waxes and cellulose, are relatively stable. Their end groups, that is that group that makes a fatty acid or an alcohol, or whatever it is, out of a paraffin, are more easily removed and a paraffin remains. Supposing the root stocks of one of the coal forming plants had contained in a part of its tissue, 20 per cent of fat consisting of palm and Japan oils, as in one of the living plants of to-day. These oils would split into their respective fatty acids and glycerin. During the coal forming period, the fatty acids, as well as the glycerin, would, to some extent at least, be deprived of the end groups containing the oxygen and result in two corresponding paraffins. It is a well-known fact, as already stated, that the coal-forming process is accompanied by the loss of oxygen.

All plants contain more or less fats and oils ranging from a fraction of one per cent to as much as 75 per cent in certain parts of the plant. There is hardly a living plant cell that has no fat or oil in it, but it is more concentrated in certain tissues as seeds, fruits and roots. In the peats, some of the fats and oils may still be detected. In the lignites, also, they may yet be detected, although with difficulty, on account of their changed nature. In the coals, fats and oils are not recognized as such by the microscope, except in the spores and cuticles which are oil-yielding. But we cannot imagine for a minute that they should have been lost completely to coals and, aside from spores they should be present either as oils or as "kerogens", that is oil-yielding substances.

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Outer covering or exines of pollens and spores are characteristic constituents of both peat and lignites. In the coals they form an important part of the attritus particularly the spores as already noted. Cannel coals are composed very largely of spores, and the organic matter of oil shales are very largely composed of them also. In Europe, there are certain deposits known as

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Acknowledgement.

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INTERNATIONAL NICKEL CO.

International Nickel Co. for 9 months ended Dec. 31, 1920, reports net profits, after charges and federal tax, of $2,620,873, equivalent after preferred dividend to $1.33 a share (par $25) earned on the 41,834,600 common stock, compared with net profits of 1,799,957 or 83 cents a share on the corresponding period of 1919.

Consolidated income account for the nine months compares as follows:

	1920	1919
Earnings	$4,415,774	$4,326,897
Other inc.	920,165	79,563
Tot. inc.	5,335,939	4,406,460
Exp., etc.	495,218	400,751
U. S. & fgn. tx.	534,841	415,341
Net inc.	4,305,880	3,351,368
Dep. & min. ex.	1,685,007	1,551,411
Net prof.	2,620,873	1,799,957
Pfd. divs.	401,067	401,067
Surplus	2,219,806	1,398,890

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INTERNATIONAL NICKEL CO.

International Nickel Co. for 9 months ended Dec. 31, 1920, reports net profits, after charges and federal tax, of $2,620,873, equivalent after preferred dividend to $1.33 a share (par $25) earned on the 41,834,600 common stock, compared with net profits of 1,799,957 or 83 cents a share on the corresponding period of 1919.

Consolidated income account for the nine months compares as follows:

	1920	1919
Earnings	$4,415,774	$4,326,897
Other inc.	920,165	79,563
Tot. inc.	5,335,939	4,406,460
Exp., etc.	495,218	400,751
U. S. & fgn. tx.	534,841	415,341
Net inc.	4,305,880	3,351,368
Dep. & min. ex.	1,685,007	1,551,411
Net prof.	2,620,873	1,799,957
Pfd. divs.	401,067	401,067
Surplus	2,219,806	1,398,890

British Columbia Letter

THE METAL MINES.

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Commenting on the press reports that the Copper Export Association has sold between 300,000,000 and 400,000,000 pounds of copper for export, Mr. Lorne Campbell, manager of the West Kootenay Light & Power Co., which supplies power to the Consolidated at Trail, and the Canada Copper Co., at Allenby, states that, if true, the effects will be felt immediately in British Columbia. The lack of a market has resulted in comparative stagnation in this Province and Mr. Campbell observes that, such a movement of the metal, would so relieve the pressure that activity would be restored.

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Although nothing much has been said of late regarding the possibility of the Mines Department, Victoria, B.C., being transferred from its at present unsatisfactory quarters to the spacious and architecturally impressive left wing of the Parliament Bldgs, Victoria, the matter is not dead. There is a prospect that it will be actively and determinedly revived at the present Session of the Provincial Legislature. Hon. Wm Sloan, Minister of Mines, is understood to be enthusiastically in favor of the move and the hesitation thus far apparent, no doubt is due to the expense attached to taking the plant and equipment of the printing establishment from its present domicile and placing it in the old Drill Hall which, while very adjacent, no doubt would have to be altered and to some extent reconstructed. There also is to be considered the outlay necessary in the refitting of the aforesaid left wing for the reception of the Minister of Mines and his staff.

There is a growing sentiment, however, that "the end justifies the means", not that there is any manifestation of the development of the reckless spirit that occasions the exclamation "expense be hanged" but because it is sincerely believed that Mines Department is not properly housed and that the switch would be a public benefaction, both in respect of efficiency and of accessibility. As it is, an important branch is housed in an antiquated timber structure—one of the reliefs of

the government buildings as they were before the days of the present magnificent stone edifice — which is placed to the rear of Parliament Square. This is the Bureau of Mines, presided over by Wm. Fleet Robertson, Provincial Mineralogist. Here is to be found, and it may be said parenthetically that it never is found without inquiry and minute direction, British Columbia's mineral exhibit, the finest display of the commercial minerals of this Province, as well as of the rarer minerals discovered from time to time, that is to be seen anywhere. To visiting geologists, mineralogists, mining men, prospectors, everyone whether scientifically, technically or with but the vague interest of the products of mother earth, the Exhibit is worth while. As an advertisement of the mining possibilities of the Province it is a silent testimonial that deserves a better fate than the constant and lamentable oblivion to which it has been consigned.

Such is the strong argument made in support of the proposal. Incidentally there is the advantage the contemplated new quarters would have of bringing together all branches of the Department — a department the importance of which is growing, as is indicated by the steady upward sweep of the monetary value of the mineral production of British Columbia. This would mean greater efficiency. The added space available would make it possible to increase the size and the value of the mineral exhibits, it being suggested in this connection that the government might secure the mineral collection of the late W. J. Sutton, in his time one of the foremost independent geological investigators of the Province. He left a splendid assortment of specimens of the rarer minerals and formations not only of British Columbia but of the world which would be an acquisition to any mineral museum. The fear is expressed that this will go out of Canada unless action is taken with little loss of time.

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After the Granby Company had spent some two and one half million dollars in the opening up of a part of these coal deposits and in the establihment of collieries, with all that that signifies in equipment and housing accommodation, and after it had laid out approximately one million and a half in the installation of by-product coking ovens at Anyox, its copper mining and smelting centre, for the treatment of the output of the Island collieries, the Esquimalt and Nanaimo Ry. Co. attacked in the courts the right of the mining company to the coal within these lands. The chief point raised in support of the claim was the allegation that the Provincial title was unsound and of no value because the Settlers' Right Act was ultra vires of the Province and had so been declared by the Dominion Government when that government disallowed the measure. There were other arguments, among which may be instanced the assertion that those representing the estate of Joseph Ganner and the interests of Mrs. Dunlop had not satisfactorily proven their just right to the benefit of the concession granted by the Settlers Rights Act, which concession consisted of the privilege of proving to the Provincial Government that the length of the tenure of their antecedents was sufficient to justify, under the early laws, their title both to the surface of the land occupied and to the minerals, including coal, contained therein.

The judgment of the Court of Appeal, insofar as the Settlers' Right Act is concerned, is that its provisions had full force and legal effect, between the time of the passage of the Act by the Provincial Legislature and its disallowance by the Federal Government. Almost a year elapsed between the first and the last mentioned event and it was during that period that the claims of Ganner and Dunlop were heard by the Provincial Government, that they were allowed, and that title was passed to the coal within the lands, which coal subsequently was taken over by the Granby Company.

On the point of the validity of the Ganner and Dunlop Claims with respect to the bona fides of the latter as "settlers" within the meaning of the Act, the Court places the two on entirely different footings. It is held that the Ganner claim for such classification has not been sustained and that "therefore the Grant is rightfully annulled." This, of course, is against the Granby Company and in regard to damages it is held that "there should be an assessment of damages on the footing of innocent trespass without negligence." What this will mean it is difficult to say but unofficially it is stated that it will not amount to more than $150 an acre which would mean something slightly over $30,000. The Dunlop Claim, however, is pronounced to be valid so that the title of the Granby Company is upheld in this 117 acres.

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NOVA SCOTIA COAL MINING NOTES.

The breaking of a wire-rope attached to a "riding-rake" on the Main Deep of No. 2 Colliery of the Dominion Coal Company, on the 8th February, resulted in injuries to fifteen men, but fortunately no fatalities. The use of riding-cars to convey men to and from their work at the coal-face has in recent years become quite general at the Dominion Coal Company's mines because of the increasing distance of the faces from the shafts in the collieries having a submarine extension. This accident is the first that has yet occurred to a "riding-rake" in this district.

The Inverness Collieries and Railway Co. at Inverness, Nova Scotia, has got into financial difficulty, and the property has been taken over by the Eastern Trust Co. representing the creditors. A delegation of the citizens of Inverness conferred in Halifax with representatives of the Provincial Government and the Trust Company, as a result of which arrears of wages were distributed to the employees. The Company has, it is understood, no orders on its books, and was unable to finance the banking-out of coal which is always necessary at Inverness, and generally at the Cape-Breton collieries at this time of the year, when water transportation is stopped by ice conditions in the St. Lawrence and along the coast. This journal, in protesting against the imposition of an embargo on export coal from Nova Scota, and in especial from the Inverness Collieries, stated in the issue of 20th August last: "During the coming Winter, and particularly during the Spring season, when the drift-ice will prevent water shipments of coal, the collieries will either have to bank out coal or remain partially idle. If the collieries as was suggested by the Fuel Controller, can be given long-term advance contracts for railway coal by the Government, with a guarantee that the coal will be taken away in the shipping season, then it would be possible for the mines to work all winter without interruption, thereby largely increasing the annual output of coal."

This comment had a general application, but these conditions are especially severely felt by a community such as Inverness, where the coal-mining company was not possessed of the necessary financial reserves to carry out winter stocking. Some of the policies of the Inverness management were strikingly contrasted with the extremely conservative management that previously controlled these collieries, and the action of the Federal Government in connection with the export embargo had extenuating circumstances, but it is fair to say that any action taken by a government which prevents profitable operations in the Summer requires the acceptance of concomitant responsibility for keeping the mines working in the Winter, if the object of that action was to increase the production of domestic mines to supply a domestic need.

RELATION OF THE PUBLIC TO THE MINING ENGINEER AND GEOLOGIST.

At the afternoon session of the 10th February during the Annual Meeting of the British Columbia Division of the Canadian Institute of Mining and Metallurgy, Mr W. G. Norrie-Lowenthal spoke with regard to the relationships that should exist between the public and the mining engineer and geologist. The speaker stated that while the general public would instinctively consult a doctor in case of sickness a lawyer in case of legal difficulty, an architect when they wanted a home built, or in fact any specialist on most matters which required a specialist's attention, the mining engineer's and the geologist's professions were sadly neglected by the public, and the majority of people did not even consider the existence and certainly did not realize the importance of these highly-qualified men whenever any mining investment was considered. The speaker said the public generally were rather prone to consult so-called old-time prospectors, or miners, or mining-camp cooks, or in fact anybody with a glib tongue who represented himself as possessing a superior knowledge of a mine or a mining district. This would be analogous to consulting a hospital orderly in case of sickness, or the janitor in a courthouse in case of legal troubles. The speaker showed conclusively that it was neglect on the part of the public to consult properly qualified authorities that had resulted in the large loss suffered by the public in wildcat mining gambles. There was no more speculation, if as much, in mining as in lumbering, fishing, or even farming, if people would only exercise the same care in their dealing with mines as they exercised in other industries. Only by the consultation of experts could the mining industry be removed from the field of the wildcat kind of gamble to that of legitimate speculation. Mr. Norrie-Lowenthal blamed the mining engineers and the geologists as much as the public themselves for this attitude of apathy and suspicion. Engineers did not sufficiently appreciate the viewpoint of the public, and were not sufficiently interested in the political and other problems of the day. He also pointed out that as a rule engineers' reports were couched too much in the language of technology, and technical matters in connection with mining were emphasised to the neglect of the more important, economic side of mining.

THE INORDINATE COST OF COAL DISTRIBUTION

The Corn Exchange Bank of Philadelphia makes some interesting statements in a recent issue of its house organ with regard to the wastefulness of anthracite distribution and the stabilizing influence of large-scale mining operations, which are of quite general application to the whole question of coal distribution and selling prices in North America. These observations confirm views put forward by the "Canadian Mining Journal" on this subject from time to time. An excerpt from the article in point states:

"The cost of distributing coal in Philadelphia is very high. Before the war, when a dealer had a "spread" of $1.25 a ton he could turn around. Now he needs $3.25.

It is difficult to conceive a less economical thing than the present method of distributing coal in this city. There are about 230 different local dealers. Those in a position to know say that 30 would be enough. One dealer handles about 1,000,000 tons, or just about one-sixth of all the anthracite burned in Philadelphia. But that dealer has a plant equipped to handle 2,000,000 tons.

There are about 7,000 coal delivery autos or wagons in use here, and nobody can estimate how many times these vehicles duplicate each other's routes, covering the same ground half a dozen times. When the food administrator during the war looked into a similar condition of the local milk dealers, the first thing he did was to recommend a consolidation of interests

which would prevent half a dozen rival milk wagons traversing one little street.

Once $9 a week hired a coal-wagon driver. Now the wages for that sort of work run as high as $35. One-quarter of the delivery vehicles are auto trucks, which dealers say are economical for long hauls, but are beaten by horses on the short hauls.

It is more or less popular to blame most of the public's coal troubles upon the big operators. Local distributors of coal who know the facts generally admit that the public owes a debt to the big operator which he will never collect.

The big operators stabilize the market, and they alone prevented a real skyrocketing of hard coal during the past couple of years. Even at that there are known instances where small independents during the worst coal stress charged as much as $5 a ton above the regular price schedule laid down by the dominating operators.

The recent advance of 40 per cent in freight rates is one new element which helps keep up the price of coal to the city buyer. So when coal dealers are asked what will bring down the price of coal, they will say that cheaper labor at the mines or a much greater output per man is the first requisite."

TORONTO NOTES.

At the annual meeting of the Tough Oakes Gold Mines held in Toronto last week an intimation was given that the mine might reopen within the next month. The announcement was made by H. G. Latilla of London, England, who represented the Kirkland Lake Proprietary (1919), Limited, which is the largest single shareholder of the Tough-Oakes Company. He stated that if the proposals of the directors to sell the assets of the company to the Kirkland Lake Proprietary were consummated, a proposition would be made to immediately reopen the mine. The matter will be further considered at a special meeting of the shareholders to be held at a later date.

Only formal business was transacted at the annual meeting of the Sylvanite Gold Mines, Limited, which was held in Toronto last week. Directors elected for the Tough-Oakes were: Dr. R. J. Robbins, Charles Richardson, E. S. Gordon, Haileybury; Albert Burt, London, Eng. and J. Y. Murdock, Toronto. The new directors are Messrs. Richardson and Gordon. Albert Burt was elected president, Charles Richardson, Vice-President and M. E. Green, Secretary-Treasurer. Three new directors were elected for the Sylvanite Mine. They are Albert Burt, E. S. Gordon and Charles Richardson. Those re-elected were G. A. Young and J. Y. Murdock. It is understood that negotiations are pending for the amalgamation of the Tough-Oakes.

Sylvanite and Burnside Gold Mines, Ltd., which would make the largest single holding of property in the Kirkland Lake district, comprising some 500 acres. The new company is known as the Kirkland Lake Proprietary (1919), Ltd. which already owns and operates the Chambers-Ferland Mine at Cobalt.

At the annual meeting of the shareholders of The Herrick Gold Mines, Limited, held at Toronto, last week, the managing director, Mr. F. C. Sutherland gave a report which surveyed the operations and development work carried on at the mines during the year. After describing successful operations by diamond drilling, Mr. Sutherland said that the drill cores from one of the veins gave an average assey of $12.88 to the ton over a width of ten feet. In addition to the various veins mentioned in the report, the diamond drills pitched up a further vein which is located about 400 feet to the west of the present workings. Over a width of nine feet on this vein, the drill cores gave an average assay of $39.10 to the ton. It is planned to undertake actual work on this vein at a later date. It is the intention of the Company to push the development on the two veins in the main workings. Present plans call for the sinking of the shaft to a depth of four hundred feet and the opening up of the ore-body at the intermediate levels. Additional plant and equipment is now being secured, and will be taken into the property this Winter, while the roads are in good condition and transportation less costly. According to the financial statement presented the Company is free from debt, with the exception of a few small current accounts.

THE ANNUAL STATEMENT OF THE HOLLINGER CONSOLIDATED MINES FOR 1920.

The Annual Statement and Report of the President and Directors of the Hollinger Consolidated Gold Mines, Ltd., for 1920, is a thoroughly satisfactory one, and fully justifies the recent appreciation in the market value of the shares.

The Profit & Loss Statement for three years compares as follows:

	1920	1919	1918
	$	$	$
Production	6,939,628	6,722,266	5,752,370
Oth. revenue	222,982	340,832	155,956
Total income	7,162,611	7,063,099	5,908,327
Op. charges	3,144,328	3,222,617	2,857,510
Oper. profit	4,018,282	3,840,482	3,050,817
Deduct:			
Taxes	225,940	286,372	82,404
Deprec., etc.	1,117,066	1,232,819	379,850
Net profit	2,675,274	2,321,290	2,588,563
Dividends	2,214,000	1,722,000	1,230,000
To surplus	461,274	599,290	1,358,563

Quick assets, consisting of bonds, cash and bullion, compare with current liabilities for wages, taxes and accounts payable, in the two years shown, as follows:

	1920	1919
Quick Assets	$5,206,257	$3,602,554
Bills Payable	335,125	261,158
Working Capital	$4,871,132	$3,341,396

These figures disclose a very liquid and comfortable cash position. The surplus stands at $3,131,852 at the end of 1920 as compared with $2,670,577 at the end of 1919.

The operating profit increase over the preceding years is remarkable in view of the fact that in 1920 the tons of ore milled totalled 650,205 tons against 711,882 tons in 1919. The General Manager states that "marked decreases in the labor supply and consequent low tonnage output necessitated the milling of better-grade ore than a normal programme would have determined. We have not, however, depleted our high-grade reserves. The net yield is $9.56, as compared with $9.40 in 1919".

Two interesting examples of the conservative methods followed by the Hollinger management are the generous writing-down of the plant equipment, which has been reduced from a first total cost of $3,700,466 to a present valuation of $1,500,000, representing 40.5 per cent of the total cost of the equipment. Even this low estimate, when compared with first cost is greater than the amount that would be realised at breaking-up prices, and it is to be presumed that the policy of annual depreciation will be continued until the capital investment represented by plant and equipment is completely amortized. All development costs, totalling $1,417,469, have been written off, an eminently proper policy.

A comparison of some of the more striking operating figures is as follows:

	1920	1919	1918
Tons of ore milled	650,205	711,822	578,755
Average value per ton	$9.93	$9.73	$10.24
Net value of gold recovered	$6,219,665	$6,722,000	$5,752,000
Ore Reserves (tons)	4,087,083	4,392,000	4,439,000
Computed Value	$41,719,670	$39,928,430	$41,080,000
Average number men employed	1,025	1,207	1,061

With regard to ore reserves, Mr. Brigham comments:

"A complete recalculation of the tonnages and values "of all veins, based upon new and more accurate data, "discloses material improvement in the gold contents. "Labor shortage has resulted in confining our efforts "to the development of better grades of ore.

"Increasing in wages and the continued high prices "of mining supplies have determined the policy of de-"leting all ore of six dollars or less per ton. The ton-"nage formerly reported in the statement of surface "outcrops is similarly treated. This does not mean "that we consider them valueless, but, keeping in mind "the present disabilities under which gold-mining is "being carried on, we feel that these items should not "be included in a conservative statement."

For the purposes of the Balance Sheet, therefore the figures of ore reserves shown in the foregoing table are corrected, and compare with 1919 figures as follows:

		1920	1919
Gross Ore Reserves	(tons)	4,087,083	4,392,000
Deduct Probable Ore.			
Veins under $6.00	(tons)	585,078	—
Surface Outcrops	"	208,000	—
Net Ore Reserves	"	3,294,005	—
Net Value		$36,596,059	$37,693,450

The great handicap the Hollinger has been under in recent months through a shortage of power is revealed by the General Manager's statement that the connected apparatus of the mine totals 7,500 kilowatts, but that the Company had been unable to obtain from the power company more than 1,700 kilowatts. An intimation is made that the extra cost of steam-generated power during the first four months of 1921 will be chargeable to the power company, presumably in default of delivery obligations. Evidently the most pressing problem of the Hollinger Mines is an adequate power supply. The capacity of the mine and mill was stated in the last annual report to be 3,200 tons daily, and it is now stated by the President that operations are curtailed by power shortage to 1,700 tons daily.

An interesting and unusual remark in the President's report may be quoted. Mr. Timmins comments as follows:

"The return of 9 per cent to shareholders during "the current year includes 4½ per cent return of "capital because the gold taken from the ore is "not replaced by anything and the total value of "the property is thereby reduced by that amount. "Comparing mining with other forms of industry "the shareholder should always bear in mind that "the amount of raw material is limited and the "capital value of his property is yearly being "diminished. Therefore, it is essential that a part "of his dividend should be applied to the amortiz-"ation of the capital represented by his shares."

The Hollinger Report is pleasing, not only in the results it shows, but in the satisfying fullness of the information given to the shareholders. No competent mine manager is content with anything less than the completest kind of statistical information, and it is not difficult to deduce from the condensed information contained in the Annual Report that the Hollinger management requires and is in possession of precisely that kind of statistical information that is a hallmark of all-round competency in mine supervision. The appreciation of the work of the General Manager and his staff which concludes the statement of the President, is, judging by the Report, unusually well-deserved.

THE PROPOSED GOWGANDA-WEST SHINING TREE RAILWAY CONNECTION.

At a largely-attended meeting of mining men, held in the office of F. C. Sutherland & Co., on Feb. 12th, on motion of Frank C. Loring, seconded by Charles G. Knott, the following resolution was passed unanimously:

"Whereas, the construction of the Timiskaming & Northern Ontario Railroad has resulted in the discovery of subsequent development of the important silver-mining district of Cobalt, which has produced nearly 11 per cent. of the world's silver since discovery; of the great Porcupine camp, which contains some of the world's greatest gold mines, and which has produced already many millions of dollars in gold; of the great Kirkland Lake camp, and also many other important and promising districts, from which the total production of the precious metals has amounted to many times the total cost of the said railroad, and which are maintaining a large and industrious population, which is a source of much revenue to the Ontario government, and, directly and indirectly, to the entire population of Ontario.

"And whereas, in the mining camps of West Shining Tree, Gowganda and Matachewan, and elsewhere in that region, similar geological conditions exist as exist

in the mining districts heretofore mentioned, and the potentialites of these districts are equal to those of the mining areas already developed.

"And whereas, the development of these districts and their permanent advent as gold and silver producers, with the consequent permanent population, and the certain revenue which will result when these districts are properly developed, depends on the establishing of proper railroad connections with the already existing railroad systems of Ontario

"Therefore, be it resolved that this meeting urges the government of the province of Ontario to seriously consider the construction of such a railroad for the best interests of the mining districts mentioned, and the people of the province of Ontario in general."

The meeting also, on motion of J. P. Bickell, seconded by Charles Millar, passed a resolution declaring that the government had the sole and exclusive right to fix and determine the route and termini of the proposed railway, in accordance with the public interest

A committee composed of Weldon C. Young, S. R. Clarke and S. J. Dixon was appointed to confer with the Associated Boards of Trade of Northern Ontario, which meet at Cobalt during the present week

EDITORIAL

ENGINEERING STATUS LEGISLATION.

Apropos of the statutory creation of Councils of Professional Engineers in various provinces of Canada, and the widespread movement to make engineering a closed profession in Canada, it may be interesting to note that the recent Report of Council of the Institution of Mining Engineers in Britain contains an announcement that a Bill for the registration of Civil Engineers, prepared by the Institution of Civil Engineers, has after careful consideration of the Council of the first-named body been considered to be detrimental to the interests of mining engineers. A Committee, consisting of the President of the Institution of Mining Engineers and the Secretaries was appointed to interview the President of the Civil Engineers to state the objections to the Bill and the Committee was empowered to take any steps that might be necessary to co-operate with any other bodies in opposing the legislation proposed. Action of this nature was taken, but has not been carried to any definite conclusion, as it has been found that the time at the disposal of Parliament would not permit of consideration of the Bill.

The Institution of Civil Engineers in Britain has not attempted to include within its membership the numerous specialised branches of engineering that do not come strictly within the ordinary conception of the province of the civil engineer, and the Institution of Mining Engineers, the Institution of Mining & Metallurgy, the Iron & Steel Institute, the Institution of Engineers & Shipbuilders, and other similar bodies that could be named, have very jealously guarded their special privileges. The Institution of Mining Engineers, for example, was granted a Royal Charter in 1915, which carries with it some very definite liberties in Britain. The range of acquirement necessary to the making of a really accomplished mining engineer is so wide and so varied that it gives him an unusual number of affiliations, and tends to decentralise his sympathies and diffuse his energies in a way that sometimes creates bewilderment in his own mind. It is therefore not perhaps to be wondered at that other branches of engineering are apt to misinterpret the mining engineer's position. Georgius Agricola, writing in the Sixteenth Century regarding the necessary qualifications of the mining engineer, listed philosophy, medicine, astronomy, surveying, accounting, architecture and the law, as some of the sciences in which he should be expert in addition to his specific knowledge of the mining art proper. The matter is therefore not one of yesterday.

The profession of the mining engineer is sufficiently ancient, honourable and important to suggest that of all those interested in his privileges, emoluments and etiquette, the mining engineer himself is most interested, and is also best fitted to guide his own policies.

The statutory law long ago recognised the special character of the work of the mining engineer by specifying his technical qualifications and prescribing a standard of competency, and all engineering-status legislation of today has to confess and avoid this preempted status of the mining engineer. Why should not the mining engineer stand therefore upon his ancient rights and ask that his actions should be free and untrammelled by supervisory affiliations, and demand that the voice of mining engineers in select council, and that voice only, should be regarded as the representative of the profession of the mining engineer?

THE NATURAL ALOOFNESS OF THE ENGINEER IN POLITICS.

The heading to a newspaper paragraph recently noted referring to President Wilson's plans after his retirement from office, read: "Wilson's plans when ousted 4th March." This little phrase is one of those lightning flashes that, probably without conscious intent on the part of the writer, illuminate some points of view, and reveal hidden things. Without emphasising the bad taste of the phrase which is quite sufficiently obvious, it is suggested there is something rotten in the tendency that impells to reference to the retiring chief executive of a great nation as being "ousted" from a position that was delegated to him by electoral vote, and from which he retires by expiry of his trust after two terms of responsibility and

has not been the lot of any previous President of the United States. It ill becomes anyone to belittle the dignity of electoral trust, and if there is any higher honour that can be conferred upon a citizen of an electorally governed nation than that of Chief Executive, (whether he be called Prime Minster, or President) it has not been announced. The little phrase quoted, innocently betrays that poisonous perversion of thinking arising from party politics which sickens decent citizens and deters too many of them from entering the public service by way of what is known as "politics". The engineer, of all men, is because of his precise habit of thought and his daily dealings with natural laws that do not lie and are immutable, averse to mixing in the game of politics, where unprecision, inaccuracy and unreasoning change predominate. Nevertheless, such abstention is something to be deplored, particularly as it is likely to be persisted in. The engineer, peace to his soul, is first cousin to the Pharisee, and not bad company at that.

THE EXPLOSIVES TESTING STATION.

Our issue of 30th April 1920 contained the first annual report of the Explosives Division of the Department of Mines, Ottawa, an organization that took ten years to assume shape. In this first report the Chief Inspector, Lt.-Col. G. Ogilvie stated that the provision of a testing station for tests of "permitted" mine explosives was a matter of vital importance, but the Chief Inspector did not seem to anticipate any early establishment of this most necessary national equipment. It is to be hoped that the same protracted and unnecessary delay in providing a testing station will not be experienced as was the case with the establishment of the Explosives Branch itself, the Act authorising it having been passed in 1910. It is very desirable that Canada should be able to issue its own list of permitted explosives. We noted last April that every notable coal-mine explosion that had taken place in Canada had as its proximate cause the flame or shock of some form of blasting powder or explosive, and it is the widespread opinion of coal-mining men in Canada that this country should long ago have possessed its own explosives-testing station. The passing of the appropriation and the provision of the Station should at once be proceeded with. Further procrastination would be unfair to the coal-mining industry.

A COAL MINER'S COMMENDABLE CANDOUR.

The address given by Mr. Thomas Graham, the General Superintendent of the Canadian Collieries (Dunsmuir) Limited, of Vancouver Island, before a joint luncheon of the Associated Boards of Trade of British Columbia and the Canadian Institute of Mining & Metallurgy, is a model of refreshing candour, and there would be less hostility shown by the general public towards mining enterprises if executives would speak right out in meeting as Mr. Graham has done. Every word that Mr. Graham spoke with regard to the treatment handed out to the coal industry in the West can be applied with equal truth to the conditions in the East. The coal-miner is the soldier of industry, regarded as a nuisance in times of peace, thought of by the public and its reflex, the government, as representing merely a burdensome appropriation, but "its a special train for Mr. 'Coal Man', when the troopship's on the tide". Mr. Graham is to be heartily congratulated on his straight talk. The coal miners and operators of Canada, taken as a whole, during the war period, did less profiteering, gave more men to the firing line, submitted to more governmental interference and received less consideration than any body of industrial workers in the country. The high prices of coal in recent years were paid on coal imported from the United States, and were the inevitable result of that neglect of the industry always meted out to Canadian coal producers in so-called normal times. If one were asked to devise a method by which Canadian unity could be corroded to the point of dissolution, by which national independence could be destroyed and Canada reduced to the position of an obsequious satrapy, it would puzzle even an accomplished disciple of Lenin to devise a more effective method than is exemplified by the traditional treatment of the coal producers of Canada in the past. Perhaps it is merely lack of method, but be that as it may, the effect is the same.

MINING PROFITS TAXATION

The taxation proposals of the Ontario Government in regard to mining profits are open to all the objections that have been urged against excess profits taxes in other countries, objections so grave that they have been admitted by the various governments concerned and have led to abrogation of imposts that have proved most injurious to business in general. The objection which is best sustained against the taxation proposals of the Ontario Government is one that it has not been possible to urge against other governments, namely that in Ontario the government has singled out mining for invidious and discriminatory treatment. On what grounds the government defends taxation upon mining enterprises that it is not prepared to impose upon all other business interests in similar manner does not appear, and it is a proper question to ask. The mining industry will not complain of taxation that is imposed upon all the public alike, and because of common public necessity; but it has good reason to complain of taxation directed against the mining industry in a partial and very marked manner. This is really the case of the mining industry, and the aspect of the taxation proposals of the government of Ontario that has caused the population of the mining districts to make common cause against unfairly injurious imposts which the government has not attempted to defend on the ground of

principle, notwithstanding that it may have explained its action on the ground of necessity. Some explanation of the government's action, and at least an attempt at a defense of its equity is due to the industry.

Not only are the taxation proposals of the Ontario government discriminatory against mining in general, but in the restricted circle of the industry itself invidious distinctions are made, the nickel-copper mines being marked out for a higher burden than the other mines. The question of principle is again indicated, as the narrow range of applicability of this higher rate of taxation is well understood.

TAXATION FORFEITURE PROCESS AMENDED IN ONTARIO.

A bill that is being introduced by the Minister of Mines at the current session of the Ontario Legislature provides that lease and mining rights forfeited by reason of non-payment of taxes shall not be open for re-staking until the lapse of one year, or until declared open for re-staking by Order-in-Council. Provision for redemption of forfeited claims by previous lessee is possible by payment of arrears of taxation, costs and a penalty of ten dollars. This is commendable legislation.

In forfeiting leases last Autumn the Ontario Department of Mines did not exercise due care to notify the defaulting taxpayers of the threatened forfeiture, and in immediately throwing open claims for re-staking the Government did not gain that possessory advantage from the re-invested title that it should have done. The whole incident was a disturbing one, and in altering the statutory provisions to prevent its recurrence, the Government is acting wisely. Due notice is just as much a part of the cancellation of a contract as the monetary lease consideration is of its continuance.

INVESTMENT vs. SPECULATION.

Our Port Arthur correspondent complains of reflections made upon the Dryden gold area by "Saturday Night" of Toronto. It is of course not open to any critic of mining enterprises to condemn as a failure any district except after careful personal examination, and from long-continued weekly reading of the "Gold and Dross" column of our lively contemporary, we believe that any criticisms that have been passed are intended to refer to the presumptions and errors of management rather than to the intrinsic physical values of any mining field. He would be a rash man that would attempt the last named appraisal without some very definite technical qualifications and exact knowledge of a selected field.

"Saturday Night" gives financial advice to people who very palpably need it, judging from the nature of the published enquiries, but does not, and properly so, counsel the placing of investment funds in mining stocks or industrial common stocks. Most of the persons who write for advice to financial editors are unable to distinguish between investment and speculation. In order to enable intelligent distinction between these two forms of hypothecation of cash assets, it is first of all essential that the person who exchanges cash for scrip should be possessed of all necessary information regarding the venture he has chosen. A deplorably large number of those who purchase mining scrip know less than nothing about the financial soundness of enterprise they have put money into, and it is for this reason, presumably, that those who have to advise persons of small means, widows and women investors, and persons quite ignorant of corporate financing and procedure, refuse to class mining stocks as "investments." The person who hopes to get rich by putting money into mining ventures—unless he possesses the ability to size up the financial stability of a mining enterprise—may of course make lots of money, but he is just as likely to lose all he ventures. It is about the same form of excitement as betting on a horse race, except that the ability to pick a winner is not so widely distributed in the populace.

In a recent issue of "Saturday Night" the best mining stock in the North Country was described as distinctly not an "investment", but as a promising speculation. The same may be said of hundreds of seasoned common stocks, preferred stocks, debentures and even bonds, purchasable today at prices to yield from eight to twenty percent. Many of these stocks, if bought today, are most likely to yield profitable returns, to those who know what to buy. At the same time, they are not investments comparable with government war-loan certificates, municipal and provincial bonds, and such issues as are permitted to trustee investors. The duty of those whose business it is to advise the small investor was never so plain as it is today, because never before in this generation were government-secured loans obtainable so easily and at prices to yield high interest returns and selected maturities.

Advice such as given by "Saturday Night"—and it is good for the most of those who ask it—is not, however, to be considered as bearing in any way upon the general question of mining as related to investment. Mining is a business, and a very profitable one. It is moreover not a less necessary business than other usual industrial activities, but it requires not less specialised knowledge. This journal does not favor the financing of mining enterprises by a multitude of subscriptions from small investors, and, if this viewpoint is strenuously objected to (as may well be the case) as shutting out a number of persons from the profits of the industry, it is suggested that the dangers that small investors avoid outweigh this supposed advantage, and that the good name of mining is more likely to be upheld by participation in mining enterprises limited to those who know what they are about and are therefore likely to choose competent technical advisors.

AS TO "SELLING" OURSELVES.

It might help to clear the viewpoint of those persons in the United States who advocate the "sale", by some unmentioned and vague authority in the British Empire, of certain territories within the Empire, if they would kindly explain how such a similar proceeding could be carried out by the United States. Suppose, for example, the United States undertook to sell California, how would the sale be initiated and carried to a conclusion? A few studies along these lines might assist some extremely ill-informed citizens of the United States in getting our viewpoint in Canada. Where is the authority that can break the entail of the British Empire? And what would the rest of the family say about it? A West Indian newspaper, irritated and fed-up with such inanities, asks: "Why should a great Empire wish to sell any part of itself?" This is a natural outburst, under the circumstances but a more comforting question would be: "How could any part of the Empire sell itself?" Search for the answer would be found vain, but not altogether unprofitable maybe.

23rd ANNUAL GENERAL MEETING, CANADIAN INSTITUTE OF MINING & METALLURGY. MONTREAL, MARCH 2nd to 4th. 1921

The Annual General Meeting of the Intitute will be held at the Windsor Hotel (in the Ladies' Ordinary).

In addition to the business and ordinary proceedings of the Meeting, a Smoker and Concert will be held on Thursday evening, the 3rd March. The Annual Dinner will be held on Friday the 4th. at the Montreal Club. Excursions have been arranged, through the courtesy of the Thos. Davidson Manufacturing Company, and the Dominion Engineering Works, Ltd., for inspection of the plants of these companies on the afternoon of Friday, the 4th. The works are situated not far apart, and can be seen in the same afternoon. They both posses features of unusual interest, the Davidson Company specializing in electric-steel castings, and the Dominion Engineering Works in paper-making machinery and in hydraulic machinery.

PROGRAMME OF THE MEETING.

WEDNESDAY, MARCH THE 2nd.

(9.30 a.m. to 5 p.m.—Registration at Windsor Hotel)

Morning Session — 10.00 *a.m. to* 1 *p.m.*

Chairman, The President,
Addresses of Welcome,
Presidential Address, by O. E. S. Whiteside.
Mineral Statistics for 1920.
The Dominion.—John McLeish.
Province of Ontario.—T. W. Gibson.
Province of Quebec.—T. C. Denis.
Province of British Columbia.—W. Fleet Robertson (or by proxy).
Province of Nova Scotia.—Hiram Donkin (or by proxy).

Intermission.—1 p.m. to 2.30 p.m.

Afternoon Session. — 2.30 *p.m. to* 6 *p.m.*

Chairman, Dr. F. D. Adams.

General Business:—

Discussion on the proposed amendments to the By-Laws to provide for the appointment of an Executive.

Report of the Publication Committee on the future printing of the Monthly Bulletin.

Engineering Legislation, etc.

Evening Session. — 8 *p.m.*

Chairman, Mr. Balmer Neilly.

Principles of Copper Leaching and Precipitation. By F. E. Lathe.

Characteristics of Ontario Gold Deposits. Illustrated by lantern slides. By P. E. Hopkins.

Suggestions for the Better Development of the Mineral Resources of Northern Ontario. By W. E. Simpson.

The Operations of the Mond Nickel Company. — Moving pictures directed by a member of the staff of the Mond Nickel Company.

THURSDAY, MARCH 3rd.

Morning Session. — 9.30 *a.m. to* 1 *p.m.*

Chairman, Capt. J. G. Ross.

"Institute Service."—Some Suggestions. By G. C. Mackenzie.

"Blue-Sky Laws as they Affect the Mineral Industry." By J. P. MacGregor.

"The Silver-Lead Deposits of the Mayo District, Yukon." By W. E. Cockfield.

Intermission—1 p.m. to 2.30 p.m.

Afternoon Session. — 2.30 *p.m. to* 6 *p.m.*

Chairman, T. W. Gibson.

"Canada's Coal Problem." By F. W. Gray.

"The Discovery of Oil at Fort Norman." Official memorandum from the Imperial Oil Company.

"Salient Features of the Geography and Geology of the Mackenzie River Oil Region." By E. M. Kindle.

"The Story of Petroleum." — Moving pictures directed by W. A. P. Schorman, British American Oil Company.

Evening Session. — 8.00 *p.m.*

Chairman, Colonel J. J. Penhale.

Smmoker and Concert in the Ladie's Ordinary

FRIDAY, MARCH 4th.

Morning Session. — 9.30 *a.m. to* 1 *p.m*

Chairman, Mr. R. L. Peck.

"Welfare Work," A. W. Macdonald.

Discussion on Increased use of Canadian Iron Ores. Messrs. Stansfield, Gray, Cowie, Dannecy, Mackenzie and Evans.

"Steel Castings for Mining Purposes" R. L. Lindstrom.

"Manganese Steel Castings in the Mining Industry." By W. S. McKee and J. H. Blake.

Intermission.—1 p.m. to 2.30 p.m.

Afternoon Session. — 2.30 *p.m. to* 6 *p.m.*

Chairman, Theo. Denis.

The Asbestos Industry.—Capt. J. G. Ross.
Super-Cements.—G. M. Thomson.
Graphite.—V. L. Eardley Wilmot.
Mica.— H. L. Forbes.
Fluorspar.—M. E. Wilson.
Feldspar.—N. B. Davis.
Brick and Clay.—J. Keele.

Evening.

Annual Dinner at 7.30 p.m. at the Montreal Club

The Coal Industry of Vancouver Island

An Address by Mr. Thomas Graham,* Before the Canadian Institute of Mining & Metallurgy, at Vancouver, February, 1921.

Having been associated with the coal industry of Vancouver Island for the past sixteen years, I shall endeavor to talk to you for a short time today in a general way on the Island coal fields.

My remarks may be somewhat rambling, as there is quite a large subject to cover. They will, however, in no way be technical, nor do I propose to weary you in quoting figures extensively. I propose chiefly to refer to certain fallacies that exist in the public mind relative to the coal field and coal industry on Vancouver Island.

Most of us gathered here today have unlimited faith in the future of British Columbia. We believe that within its boundaries lies immense mineral wealth; this wealth awaits the advent of the prospector to bring it to light, capital to produce it, and the development of our coal resources to manufacture and shape it to the wants of a world eager and willing to pay for it.

Our Province in no sense can be termed agricultural; its greatness must lie in its timber, fishing and mineral resources, and our ability to manufacture; and no country can be great in manufacturing when dependent upon some other state or country for their fuel supply.

Experience gained during the war has demonstrated to the world that industrial supremacy lies with a nation in proportion to its ability to produce or control the fuel to drive its machinery.

Despite the part that fuel oil has played in retarding the development of the coal industry in British Columbia, it, generally speaking, plays a small part in the world's production of steam, and is every day destined to play a smaller part. The industries of the world are today run by coal and will be so run for hundreds of years to come. Floyd Parsons, late editor-in-chief of "Coal Age," a journal devoted to coal, makes the statement that we have on the North American continent enough coal to last us 1,500 to 2,000 years, and enough oil to last us 10 or 12 years.

The production of coal in the Province of British Columbia was 500,000 tons less in 1920 than in 1910 —some room for thought in this statement. That is to say that during the decade in which British Columbia made the greatest industrial strides in its history its basic industry, coal, retrograded

To those of you who have made and watched with pride the industrial progress of this city in the past ten years, it should be quite plain that such progress should be upbuilding prosperous communities adjacent to you, paying tribute to you as their chief distributing point. Such would have been the case on Vancouver Island had its coal industry kept even pace with the growth of your industries.

Fuel oil has displaced approximately 600,000 tons of Vancouver Island coal per year, and, at present prices paid for oil, means that we are sending out of this Province $6,000,000 per year that should be spent in supporting our own industries and building up our own Province. Six million dollars per year to help swell the balance of trade against us and depreciate the value of our own dollar.

The transportation companies, rail and coastal waters, who had most to gain by the upbuilding of our own Province, contribute largely to this amount. But they are not alone in this; your manufacturers and the owners of the large business blocks in this city and Victoria all contribute, and are largely responsible for a condition that a few years hence will block and retard the industries of this Province.

And, may I ask, what have the Boards of Trade done to develop the coal industries of this Province? If my memory serves me right, in 1915 the coal mines of Vancouver Island were working one and two days per week, and an attempt was made to have a slight increase placed on the tariff on California fuel oils, to permit the mine employees to obtain sufficient employment to live. The Vancouver Board of Trade opposed the movement, preferring to build up the industries of our neighbor to the South rather than those of our own Province.

I note since arriving in your city to attend this meeting that the Associated Boards of Trade of British Columbia have launched a great movement for the purchase of made-in-British Columbia goods, and much display and advertising is being done to impress the importance of the movement upon the people of this community. I am heartily in sympathy with your movement, but I have been wondering, if the promoters were really honest with themselves in the movement. Are you honest enough to tell the public that your made-in-British Columbia goods are manufactured with imported oil, or that they are being sold to them in buildings heated with imported fuel?

But I started out to speak of some of the erroneous ideas existing in the public mind re the coal areas and the coal industry of Vancouver Island.

The resources of this Province are sufficiently large and attractive to satisfy most people, without resort to gross exaggeration and misrepresentation

I fear that in many instances, for promoting as well as political purposes, much exaggeration and misrepresentation has been indulged in, and to such an extent that many people who are right on the ground, and who should know better, have in their optimism been carried away by such statements and readily make use of them

It is quite commonly believed that the greater portion of Vancouver Island is underlaid with several seams of high grade coals In fact, many people believe that you can back a barge up against any portion of the East coast of the Island, scratch a little of the soil away, and proceed to load coal on the barge

Some millions of years ago—how many I do not care to venture to guess—in that age known to geologists as the Carboniferous, a period when Nature so far as coal making material was concerned was in a most generous mood, the great coal deposits of the eastern portion of this continent were laid down. If the geologist is correct this portion of the continent on which we live did not then exist. And in proof of their theory we have no trace on the western portion of the con-

*General Superintendent Canadian Collieries (D) Limited, Vancouver Is

tinent belonging to that period. I presume some millions of years later this portion of the continent appeared, and we have the rocks belonging to the Cretaceous period lying close upon the trap or igneous rocks. It is to this period that the Vancouver Island coals belong, and apparently Nature was not in such a kindly mood at this period, as the seams are interlarded with many intrusions of shale, some of these bands varying from inches to a smuch as four to six feet in thickness.

The area of the deposit was undoubtedly large, but long following the formation of the seams the great uplift that formed the mountain range now comprising the backbone of Vancouver Island, and the corresponding drop which formed the area now known to us as the Gulf of Georgia, destroyed the greater portion of the field. Following this came the Glacial Period, which completed the work and eroded much that the uplift had spared, until today we find that instead of the greater portion of the Island being underlaid with coal, there are only a few isolated basins left, and these are very much faulted and disturbed.

It is generally believed that the E. & N. land grant on Vancouver Island, comprising approximately two million acres, is all underlaid with three seams of coal. The public are not to blame for this belief, as it has been fed to them by promoter and politician for the past forty years. At the risk of being termed a knocker and a pessimist I desire to say that at least one and one-half million acres of the two million acres in the grant cannot possibly contain coal, being denuded of coal bearing strata. Of the half million acres left which may contain coal, but the greater portion of which is unproven, we know that large areas do not contain coal in seams sufficiently thick and advantageously placed to have commercial value.

There have been some very good, although small, detached basins of coal on Vancouver Island, as at Old Wellington, Extension, Nanaimo Harbor, and adjoining Comox Lake, and it is probable that there are some more similar basins on the Island, but they have to be found and proven.

There are, however, no large extended areas of unbroken coal measures on Vancouver Island, containing continuous and regular seams of coal similar to those of the Eastern portions of the continent, or in the plains and foothills of the Rocky Mountains. We have only very small basins much faulted and contorted with many barren spots, containing seams very dirty in character, and presenting problems to the mining engineer unequalled in any mining country in the world.

The present areas now operating are principally those originally opened, and the mines are now very old and cover immense areas, and the coal being produced is chiefly that which, in the early days of the mine, was either lost or left because it was too dirty or too thin to work at a profit.

You will naturally ask why we do not open new mines. The reason is simple, we have no proven territory in which to make the openings and it requires money to prove and open new mines on Vancouver Island. To illustrate this, the Canadian Collieries (D) Limited, by whom I am employed, have for the past two years been prospecting a likely basin. During that period we have made twenty-one miles of roads for transporting diamond drills and supplies to run these, we have drilled twenty-five holes an aggregate of 15,000 feet, the area so far prospected does not contain more than 1,000 to 1,200 acres, the work has cost, $100,000, and the information obtained to date is not sufficient to fully convince us that the field has commercial possibilities, and would justify the cost of development and building of ten miles of railroad to connect the field with tide water.

Again it is generally believed that we pay the coal miner around seventy cents per ton for mining and the difference between that and $9.75 received for lump coal at the docks is clear profit. Now, the tonnage rate of the miner at present is slightly over $1 per ton, plus a yardage rate, plus so much for setting timber, plus a cost of living bonus of $2.09 per day, but the actual coal miners form only approximately 25 per cent of the men employed in and around a mine; they merely break down the coal at the working face. The great army of men are employed in transportation, maintenance of roadways, ventilation, timbering, pumping, tracklaying and general preparation of the coal, and are paid by day labor. Some idea of the amount of this work will be obtained when I state that No. 4 Mine of the Canadian Collieries, Comox, covers an area of over 1,300 acres, and that the nearest coal-producing place in this mine is almost three miles from the entrance of the mine.

An eight-hour day in a coal mine is eight hours from the time the workman leaves daylight until he returns to daylight; when he travels these distances to and fro and lunches during the period, the net result is about six hours actual work.

The actual miner is paid for the weight of coal contained in the mine car at the tipple. This is known as tipple weight, and is the production of the mines given from month to month in the press by the Mines Department. The coal is here screened and separated into the commercial lump coal sold as such on the market, and screenings; these two products are then transported by rail to tidewater, at Comox, a distance of twenty one miles, and at Extension, a distance of eleven miles.

The lump coal and screenings are, relatively speaking, fifty-fifty in proportion. The screenings are then submitted to a washing process. This product contains a large quantity of fine shales from the rock bands contained in the seam and cannot be extracted except by a mechanical process which is called washing and consists of agitating the material on a series of jigs, in water, the difference in the specify gravity of the coal and rock being used to separate these two substances. The product saved is again separated into nut coal, pea coal and fine coals.

Fifty per cent of the tipple weight goes to the washer, and in the process of washing forty to fifty per cent is lost, being too high in ash for commercial purposes. In a colliery having a tipple tonnage of 2,000 tons per day, 1,000 tons would be a lump coal and 500 to 600 tons of washed products, making a daily commercial recovery of 1,500 to 1,600 tons from the 2,000 tons the miner was paid for at the tipple.

The production of the Canadian Collieries in 1920 was 100,000 tons less than in 1919; thirty-seven days were lost in the Comox colliery, due to lack of demand and here let me say that our mines are not like a factory, we cannot lock the door and leave them on an idle day, like you lock your store or factory. The roadways and ventilation must be maintained and water pumped. The gases and water do not stop when we stop producing coal. It costs us $2,000 per day to be idle.

We have three mines in the Comox Collieries in which the ventilating fans run twenty-four hours per day 365 days in the year. Each is capable of producing 200,000 cubic feet of air per minute, and each fan requires a 350 h. p. motor to drive it.

As an illustration of our water problem, we have one mine producing 750 to 800 tons of coal per day; we are hoisting from this mine 1,200 gallons of water per minute; at ten pounds per gallon this is 12,000 pounds, six tons per minute, 360 tons per hour, 8,640 tons in twenty-four hours, or eleven times the weight of the coal produced.

In addition to the large quantity of water handled, it is acid in character, and all the pumps used must be made of bronze.

The Vancouver Island field will never be a large producer of coal as compared to other coal-producing centres. The cost at the docks is in no way out of keeping with the natural difficulties of the field, neither has the cost of the product at any time during the war and reconstruction period been out of keeping with the general advance in cost of labor and supplies.

The coal industry has been the only industry in British Columbia that has practically been controlled by the Government during the war. The labor Department regulated the advance in our labor rates, in accordance with the cost of living, and the Fuel Controller regulated the advances in selling prices.

Our entire business, production and selling, payrolls, cost sheet and receipt, from the first appointment of the Fuel Controller to the present time, are monthly sent to the Government at Ottawa, who are as familiar with our business as the auditors of our own company.

Vancouver City has for the past six years been fortunate in its coal supply; throughout the entire war, and the two years since, not a day has been lost by Vancouver Island mines through labor troubles; your supply of coal has been regular, when the rest of the world was rent with labor troubles, and lacked fuel to operate their industries and heat their homes.

You obtained this supply, not at an outrageous price for labor, but at a price that was only in keeping with the increased cost of living. I desire to here pay tribute to the fairness of the miners on Vancouver Island. At a time when their product was an absolute essential to the country, they faithfully abided by their agreements and rendered splendid service to their country.

Both the miner and the operator of Vancouver Island are to be congratulated on the achievement of the past six years. It is unequalled in any basic industry in any country in the world.

The price to you today is 100 per cent above pre war times. Now, as business men, I appeal to you, how many of you have been handling goods during the past few years that have not increased that amount in price?

The increase in our labor cost was approximately 95 per cent, and the remaining five per cent is easily accounted for in rise and cost of material.

A coal business, as you will note from what I have said, is seasonal. There are two seasons in Vancouver, the season in which you don't give a damn if every mine on Vancouver Island closed down and every miner and his family starved; and, the season when a cold spell strikes you and you expect that the people who kept us alive during your indifferent spell should be told to go to blazes and get their coal in order that your temporary wants may be relieved. I had almost forgotten a third season, which is also peculiar to Vancouver. I refer to that season immediately preceding the municipal elections, when the good steaming qualities of Vancouver Island coals are much in demand to raise the necessary pre-election pressures to the blowing-off point.

Then there is the ever ready belief that over capitalization of the coal companies is the thing that makes Vancouver Island coals cost so much by paying dividends on watered stock.

Many of you remember that the Canadian Collieries bought the Dunsmuir coal interests in 1910 for eleven million dollars. Much preferred and common stock was placed on the market, and a debenture issue of $5,000,000 gold-bearing bonds was floated in order to raise money to develop the property. These bonds carried six per cent interest. The interest was paid on this issue in 1911, and one per cent of interest has been paid on one dollar of the issue since that year. In 1914 the bondholders took over the property to protect their interests so that the preferred and common stockholder ceased to have an interest in the property. The bondholder decided to forego interest on his bonds until after the war. Since that time the company has been reorganized and the bondholder accepted in the reorganization $500 of stock for every $1,000 of bonds he owned, so that this company has not paid a cent of interest on its bonded indebtedness in the past nine years, let alone any interest on stock, either real or watered.

A second company on the Island recently closed down, being unable to meet its payroll.

The day is not far distant when this city must return to the use of coal for power and heating purposes. When that day comes the coal industry of Vancouver Island is in no shape to take care of your wants. It has been neglected and starved, and will be unable to respond on notice to the increased production required to maintain the progress you have made in this city during the past ten years, a progress built on imported fuel. You will then pay for the past neglect, not only in price but in curtailed output of your factories, through insufficient supply of that material on which your whole industrial fabric must rest—namely, coal.

In conclusion, Sir, let me say that the producing end of the coal business in no way fears investigation into their operations. We do, however, strongly object to the verdict being rendered before the investigation has functioned.

We, however, believe that although you live only a few miles from us, you have been too busy attending to your own affairs to get acquainted with our business, and therefore, on behalf of the Canadian Collieries (D.), Limited, Sir, and a committee of your mining division, an invitation to pay us a visit. We shall be pleased to show you our conditions, and we feel confident that we can convince you that there are many industries in British Columbia that are more pleasant, more remunerative and less hazardous, financially, than coal mining.

We would be pleased if Mayor Gale of your city, could accompany the committee. We do not expect that the smile for which your Mayor is so justly famous, will dispel the gloom that eternally pervades the interior of a coal mine, but we hope he may garner sufficient information on our business to enable him to remove many of the erroneous ideas held by his fellow citizens about the coal industry of Vancouver Island.

Notes from the Pas, Manitoba

By REECE H. HAGUE.

Lignite in Northern Saskatchewan.

Considerable interest has been excited in The Pas district over the discovery on the Carrot River, some 100 miles South-west from The Pas, and across the Saskatchewan boundary, of a deposit of lignite.

The Pasquia mountains, in which the discovery was made, have long been known to contain oil shales, and much speculation has been rife as to the possibilities of a future petroleum industry in those parts. However, the recent discovery of lignite is the first time for many years that any rumour of coal occurring in the locality has become prevalent.

For the most part prospectors in The Pas district have been too busy searching for gold, silver, copper, and other metals, to think much about The Pasquia hills deposits of oil shales, and consequently the locality has been practically overlooked.

Some time ago, however, an outcropping of coal was discovered by Indians in the Pasquia Hills Forest Reserve. The discovery was examined in December by a prospecting party sent out from The Pas by Col. W. H. Coy and Thos. C. Strain of Vancouver. A sample of the outcropping proved so attractive upon examination that Messrs. Coy and Strain, backed by a syndicate of Saskatoon business men, sent out a second party to continue the work of exploration. The party returned to The Pas a few days ago, with further samples and data, and were most enthusiastic over the discovery. Col. Coy has left for Saskatoon to have samples analysed by the Department of Chemistry of the Saskatchewan University. Further exploration work by means of diamond drilling will be commenced as soon as the syndicate can get the necessary machinery upon the ground.

A large acreage has been staked and registered by Col. Coy's syndicate, and the result of further development is looked forward to with great interest among local mining men.

Samples are on exhibit at The Pas, and in addition to lignite show a bituminous matter in a grey clay. Other samples show the half-way stage in the process of coalification of vegetable matter.

The location of the discovery is six miles from the proposed railway line from Melfort to The Pas, to connect up with the Hudson Bay Railway.

Should the new find prove economically important it will have far-reaching effects. Once the smelter at the Flin Flon mine gets under way large quantities of fuel will be required, and if a local supply is available it will save large sums of money in transportation charges.

In addition to the oil-shales occurring in the Pasquia Hills, there are large deposits of clay, which may prove suited for pottery work. Settlers have in the past been in the habit of using this clay for chinking their cabins.

The hills also contain considerable quantities of ochre, used locally for paint, and the salt for the tables of the settlers is also found in the same district.

It is anticipated that the coming Spring will find a number of prospectors visiting The Pasquia hills, and a more intensified prospecting may reveal further mineral occurrences.

NOTE.—No mention of lignites in the locality mentioned by our correspondent can be found in the reports of the Geological Survey, but Mr. Dowling's memoir on the coal resources of Canada notes a few occurrences of coal in the Dakota sandstone. This formation he states is exposed along the base of the Cretaceous plateau through Manitoba and into Saskatchewan, south of the Churchill River. At one place, east of Lac la Ronge a lignite seam. 2 ft. 6 ins. thick in the lower part of the Cretaceous escarpment, was traced for 3¼ miles. A proximate analysis of an outcrop sample of this seam gave moisture 11.23 per cent., volatile 30.97 per cent., fixed carbon 34.8 per cent., ash 33 per cent. (There is apparently an error in these figures as given in the report). The Carrot River occurrence lies over a hundred miles to the south-east of Lac la Ronge.—Ed.

Flin Flon Railway to be considered by Manitoba Legislature.

Of vital importance to the mining interests of northern Manitoba is the question of the railway from The Pas to the Flin Flon property, which will come up for discussion before the Manitoba Legislature sometime within the next few weeks.

A survey of the proposed railway is now being made by engineers of the Canadian National Railways, authority for which, at an approximate cost of $15,000, was given by the provincial cabinet last November. This with the latest report on the whole district by Professor R. C. Wallace, Commissioner for Northern Manitoba, will be laid before the Legislature during the present session.

The Flin Flon ore-body, which was discovered in the summer of 1915, is recognized to be one of the largest mineral-bearing bodies in Canada. The work done to date has been more or less in the nature of preliminary development work, which has been rendered costly by lack of adequate transportation facilities.

A New York syndicate, which secured an option on the property for one year from last March, has expended some $300,000 in shaft sinking cross-cutting, drifting, etc. Prior to this syndicate taking up the property, about $500,000 had been done on diamond drilling and other work, and an ore body of approximately 16,000,000 to 20,000,000 tons had been blocked out. At a depth of 900 feet, when the diamond drilling ceased, good ore was found. Recent work has disclosed another ore body, the extent of which cannot be guaged, and was not encountered in diamond drilling. The ore carries an average value in copper, gold and silver contents of about $10 a ton.

The all-important question in regard to this property is transportation. By airline the Flin Flon is 68 miles from the Pas, and a railroad by the most feasible route would be some 85 miles long.

A "try line" is now being run from mile 7 on the Hudson Bay Railway, the route running for some 35 miles along a gravel ridge and then going around Lake Athapapuskow and Schist Lake, passing through a greenstone belt in which many good properties have been discovered.

It is estimated that the cost of construction would be approximately $30,000 per mile, bringing the total cost to about $2,500,000.

Considerable interest has been displayed by the Manitoba provincial government in the furtherance of the Flin Flon mine's development. Last September some of the members of the Cabinet, as well as a number of members of the legislature were the guests of The Pas Board of Trade on a visit to the property, and evinced considerable interest in what they saw.

Not only is a railroad necessary to development to the Flin Flon property, but it would add impetus to mining in the whole district. The proposed line would run very close to the Mandy Mine, from which over $2,000,000 worth of high-grade copper ore have already been shipped to the smelter at Trail, B.C., after almost insurmountable transportation difficulties. This deposit is known to contain at least an additional $15,000,000 worth of low-grade ore which could be worked at a profit with a smelter at Flin Flon.

Another property which lies near the proposed railway line is the Baker-Patton discovery on the north arm of Lake Athapapuskow. Professor Wallace visited this property some little time ago, and in the course of his report said: "The claims are staked on an iron-sulphide body of total width on surface-showing of at least 130 feet and of probably still greater width in a muskeg adjacent to the rock exposure. There are many iron-sulphide bodies in the mineral belt, the mineralization being in practically every case pyrite with a relatively small amount of pyrrhotite. The iron-sulphide body under discussion is particularly important, in that, for a width of 18 feet, chalcopyrite mineralization occurs to such an extent that a channel assay will run probably from 3 per cent to 5 per cent copper over this width. Copper mineralization also shows to a much smaller extent immediately east of the ore-body mostly in quartz veins.

> "So far as exploration work has yet gone, the ore body is strictly limited to the North, but its southward extension and its total width have not yet been fully explored. I have felt for some time that there is a great opportunity for exploration work in the larger of the iron-sulphide bodies in this territory, particularly in the vicinity of the districts through which the proposed Railway to Flin Flon property will provide easy transportation. The property under discussion is one which offers sufficient surface showings to justify very considerable underground exploration by diamond drilling. I also feel that the whole district in the vicinity of these properties is one which promises well for further prospecting and is one which will, in all probability, be closely served by the railway when it passes through to the Flin Flon property."

Another district which could be served by a short branch line from the Flin Flon railway would be the Copper and Elbow Lake locality, where some really good prospects occur, both in the way of sulphide bodies, and quartz outcroppings carrying good values in gold. The railway route passes through the Cranberry Lakes district, which also affords good prospecting ground.

The Pas mineral belt has never been really prospected up to the present, although good indications have been discovered, but with the advent of a railway into the district, intensified prospecting could be carried out, when, there is every reason to believe many other valuable properties would be uncovered.

A recent invention in Germany is an illuminated gauge-glass, adaptable to stationary or locomotive steam-boilers, which enables the height of the water in the gauge-glass to be observed independently of the illumination of the boilerhouse or other surroundings. The waterlevel itself shows as a brightly-lighted white line, and can be observed from a considerable distance either by day or night.

THE DRYDEN, ONT., GOLD AREA.

By J. J. O'CONNOR, Port Arthur.

The mining companies operating in the Dryden district feel that great injustice has been done to that part of the Province, by an item that appeared in "Saturday Night," of January 1st, under the heading of "Gold & Dross," in answer to L. B., of Chicago, Ill. They strongly resent, and rightly so, the publication of erroneous statements of a sweeping character, condemning an entire mining area as "having gone down as a failure," qualified by the statement that "some day there is the chance that some enterprise may prove to be the exception to the rule."

Mining, at best, is a hazardous and venturesome enterprise deserving of the greatest encouragement, when being carried on in a legitimate manner, as it is being carried on in the Dryden district, by the two companies now operating there.

These companies, The Contact Bay Mining Company, Ltd., and the Wachman Mining & Milling Company, Ltd., have expended well over a quarter million dollars during the past four years, in a legitimate endeavour to prove whether this gold-bearing area has payable-bodies, or not. Neither of these companies has been dependent on stock-jobbing methods to raise its money. They have played their own game, with their own money, and have left the public severely alone, which is more than can be said for many mining ventures, legitimate, and otherwise. The management of these two companies, with all the knowledge that four years' experience has given them, make no claim, as yet, to being "thoroughly familiar" with either the formation or ore bodies of the district, but feel that they are fairly entitled to pass judgment on the possibilities, so far as development has proceeded.

This district has always been noted for the large number of parallel quartz-veins, with an east and west strike, covering some miles from North to South. It is the belief of the best informed men in the territory, that, given intelligent and conservative methods of development, and the adoption of the most efficient means for the recovery of the metal values contained in the ores, that many profitable mines will be located within the area, and that there are reasonable possibilities that it may develop into another Porcupine. In any event, it is much too early to classify this area among the "failures," as reasonable time should be given to prosecute the full development of the ore bodies now being operated.

The Contact Bay Mining Company, under the superintendence of Mr. H. S. Badger, have opened up two properties, one known as the Rognon, the other as Bonanza. The Rognon working-shaft is down 100 feet, with over three hundred feet of drifting on the two levels. They have opened up an ore body averaging four feet in width, with an average value of $8.00 per ton. The character of this ore is such, that occasionally rich pockets are encountered, none of which is included in the above average value. The ore occurs in well defined shoots. Outside these profitable mining can not be carried on. Having determined the existence of these ore shoots, and that they carried to depth along certain well defined lines of pitch within the vein, they decided to close down work on this property, pending the erection of a mill.

They have put down a working shaft of the Bonanza that is now 86 feet deep. Two drifts from this point, running East and West, have a combined length of 286 feet. The shaft has been put down in the ore body

which has been found to widen with depth, and to increase in valne, and is now in an ore body that has increased from 12 inches to 5 feet. Under an arrangement with the Reddemer Mine, they have just made a mill-run of 120 tons, through the last named Company's mill, which averaged from $12.00 to $22.00 per ton, by amalgamation alone, with tailings running to $5.00 per ton. The future work as outlined, and to be immediately prosecuted, is to fully develop this ore body by further sinking and drifting. Contracts have been let to continue the shaft another 100 feet, and to drift on this lower level.

Heretofore, all operations for the recovery of values have been confined to amalgamation. In the future, modern methods for the maximum of recovery, will be adopted by this Company.

D. J. Browning, of Chicago, Ill., is Consulting Engineer for the Contact Bay Mining Co., Ltd.

SITUATION AT INVERNESS COLLIERIES, NOVA SCOTIA.

During the week ending the 17th February, meetings have been held at Halifax between the representatives of the provincial government, the trustees for the bondholders, and the workmen and trades people at Inverness, Cape Breton Island, seeking for means by which the Inverness Collieries might resume production, and thereby give employment to a number of men now idle.

The difficulty at the Inverness Mine really originates in the exhausted condition of the No. 1 Mine. There is a very large area of pillar coal to the rise of the working faces, which are now so far out to sea that the conveyance of the coal from the deep to the pit-mouth against a heavy pitch makes the haulage costs extremely onerous. Similarly high cost, arising from the same cause accompanies the pumping of the mine-water, which is also extremely acid in character and is destructive to pumps and pipelines.

While the absolute necessity to reduce operating costs is seen by all concerned, the miners are opposed to any reduction in wages because of the reflex such a procedure would have on the newly-made agreement on wages applying to the whole of the coal-mines in the Province.

As a result of the meetings held in Halifax proposals have been agreed to between the workmen and the trustees for the bondholders for a reorganization of the working forces with a view to obtaining greater efficiency, and for the extraction of coal from pillar areas.

There is an overlying seam on the Inverness properties, which it is expected will be developed energetically in view of the spent condition of the No. 1 Mine. An opening has already been made upon this seam.

The ability of the trustees for the bondholders to operate the mine, at this time, depends on the securing of a market, a very difficult problem during the season of closed navigation. No statement has yet been made as to the probable date of resumption of production.

The situation at the Inverness No. 1 Mine is similar to that which will have to be met in all the submarine mines off Cape Breton Island, and the problem which now faces the Inverness Company is more than usually acute because this operator has been depending entirely upon a submarine territory with which difficult engineering problems are associated. The continued advancement of submarine working-faces, unaccompanied by methodical extraction of pillars left in the first working, cannot, of course, proceed indefinitely, and the Inverness Mine is one of the first in Nova Scotia to reach the *impasse* that comes when the cost of production from remote submarine faces exceeds the selling price of the product. Mr. Walter Herd, in a paper read before the Mining Society of Nova Scotia in May last (see our issue of 21st May 1920, pp. 410 and 413) dealt with the application of hydraulic stowing to this condition, and intimated that the "pillar and room" method of coal extraction was unsuited to the winning of submarine areas and should be abandoned in favor of a panel system of extraction, combined with hydraulic stowing of the waste. In the thicker seams Mr. Herd advocated following up the first working by immediate extraction of the pillars in each panel, the waste being filled by flushed material. In the case of thinner seams he advocated a panel-system of retreating longwall combined with hydraulic flushing of the waste. The practice of leaving vast areas of ungotten pillars in the rear of working faces advancing indefinitely seawards, on seams with a continuous seaward inclination, is one that must be revised, and Inverness Colliery presents precisely the problem that will result in every case where this practice is persisted in.

There is another consideration, which was strongly pointed out by Mr. Herd, accompanying the mining of superimposed seams simultaneously. Hydraulic flushing would, states Mr. Herd, "allow of this simultaneous extraction, an operation that without it should be highly condemned, being the ruin of many mines."

In the submarine areas of the Sydney Coalfield there are at least seven, and possibly more superimposed seams extending under the sea, all of them workable seams containing good-quality coal. Hydraulic stowing, as Mr. Herd was careful to point out, is not an easy or a simple matter, but "it well deserves the careful consideration and co-operation of those interested in the ultimate recovery of all the coal."

A further obervation is suggested by the plight of the Inverness Collieries, namely that the local conditions of coal mines in Nova Scotia must be taken into consideration by all interested in wages, selling prices and government restrictions. For many years the principle of a differential in wages which would allow for local differences in the cost of mining and transportation of coal was recognised by the miners' union in Nova Scotia, but the most recent agreement regarding wages has established the principle that all mines —irrespective of local conditions must pay the same rate of wages. The Inverness incident proves the wisdom of the old arrangement, and indicates the impossibility of applying the new principle, except by allowing the necessary effect of closing down all the coal-mines but those where cheap operating is feasible.

Also, in imposing government restrictions — such as the export embargo of last Summer—the necessitous and peculiar condition of some mines must be taken into consideration. This consideration applies also to the selling price of coal.

Our issue of 11th February contained some notes on the asbestos mines in Quebec, for which credit should have been given to "Asebestos" of Philadelphia. The mill of the Asbestos Mines, Ltd., at East Broughton, Que., was incorrectly stated to be the largest asbestos mill in Canada. This should have read "the largest mill in East Broughton".

Annual Meeting of the British Columbia Division of the Canadian Institute of Mining and Metallurgy, Vancouver, Feb. 9-12th 1921

(Reported by ROBERT DUNN, Victoria, B.C.)

There were two special features of the annual meeting of the British Columbia Division of the Canadian Institute of Mining & Metallurgy, held at Vancouver from the 9th to the 12th of February. One was the discussion of the problem of economically treating the complex ores of the Kootenays, combinations of zinc, silver, lead and iron, and the other the question of coal mining on Vancouver Island, its difficulties, and the resulting high price of the commodity in provincial centres quite adjacent to the mines.

An address of welcome by Mayor R. H. Gale occupied the Session of the morning of Wednesday, the 9th inst. This was followed by a complimentary luncheon to the visting members of the Institute after which, with Wm. Fleet Robertson, Provincial Mineralogist in the chair, the business was opened with a general resume of the mining activity of 1920 and the prospects for the new year.

Mr. Fleet Robertson's Resumé.

Mr. Robertson pointed to the satisfactory showing made in respect of output, 1920 being an improvement over 1919 of approximately 7 per cent, notwithstanding adverse conditions. Latterly there had been a marked falling off in copper production, as well as in connection with other phases of the industry, for the reason that the market was weak and uncertain. In the years 1913 to 1916 the cost of mining copper was 9 cents per pound; in 1917 the cost averaged 12 cents; in 1918, 18 cents, and it was estimated that the figure would be 20 cents for 1920. The only remedy was for the price of copper to rise or the cost of production to fall. Personally he thought there would be a compromise between the two. The readjustment was underway and it would not be long, in his opinion, before equilibrium was re-established. Then renewed activity might be looked for.

The Unprospected Northeast.

Large sections of the northeast territory of British Columbia had never been traversed by the prospector asserted John D. Galloway, government engineer for that district. This applied particularly to the portion north of the Grand Trunk Pacific Ry. Most of the mineral deposits under development in this region fell within the classification of medium-grade ores but high grade ores also were to be found. Placer gold production in the North would be about the same for 1920 as 1919, but in copper mining there practically was nothing doing. Considerable attention now was being given to the dredging of placer ground and many sections were being tested by the Keystone drill with the intention of initiating this form of activity if the possibilities were found to warrant it. The Provincial Government had undertaken this form of development at Harper's Camp but no conclusive results could be reported. The Cariboo Platinum Extracting Co. was engaged on a large scale at Quesnel. There was no doubt that some new dredging would be started next season.

The Boundary District.

Notwithstanding that the Hedley Gold Mining Co. has closed down temporarily and that the Copper Mountain Mines are idle, P. B. Freeland government engineer for the Boundary District, in which these properties are situated, was able to sound an optimistic note regarding the outlook for mining in the southern part of the province. He said that there was a good reason to believe that the Nickel Plate Mine soon would resume work. The Canada Copper Co. would begin production just as soon as the copper market righted itself. There were many promising properties in his section as yet in the development stage and he referred to the diamond drilling of the Provincial Government in the Franklin Camp as being likely to be productive of much good.

The Kootenays.

The Kootenays were dealt with by W. A. Langley, government engineer, referred to the remarkable showing of the Sullivan Mine, Canadian Consolidated Mining & Smelting Co., the further development of which had proven immense ore-reserves. While mining generally had been affected last year by strikes there was a shipping list in the district of between seventy and eighty mines. Increased attention was being paid to placer mining.

Portland Canal and Alice Arm.

George Clothier, engineer for the northwest, was unavoidably absent and delegates heard from S. J. Schofield, of the Geological Survey, and P. W. Racey, well known operator, regarding the Portland Canal and Alice Arm zones. The former explained that the former area, where is situated the famous Premier Mine, has by no means been fully prospected and that it is probable more highly productive properties will be located and developed. Mr. Racey touched on the work of the Dolly Varden Mine, stating that 29,600 tons of ore had been shipped from this property in 1920, which averaged twenty-seven ounces of silver. Outside of the Esperando, the Dolly Varden was the only mine that was shipping from Alice Arm during the season. There were, however, many good looking prospects in the district and the future of mining in the section was bright.

South Western District and Vancouver Island.

Wm. M. Brewer, of the south western district, spoke of the prosperity of coal mining on Vancouver Island, the product of the collieries being considerable in excess of the 1919 record. He dwelt also on the development of the Britannia Mining Company's property, Howe Sound, and predicted a likely future for the Lucky Four Group in the Cheam Range.

Distribution of Prizes for Student Papers.

Hon. Wm. Sloan, Minister of Mines, was present during the day and presented prizes won by students of the British Columbia University for essays on mining and metallurgy. L. B. Shaw won first for a paper on Metallurgy, and S. O. Swanson was awarded first for a composition on mining. Mr. Sloan, in complimenting the young men, promised that he would consider the possibility of having their literary efforts published in the Annual Report of the Minister of Mines for 1920.

In the evening a lecture was delivered by T. B. Adams, of the Commission of Conservation, on "Mining Camp and Village Planning and Improving."

Discussion on Metallurgical Practice in B. C.

Under the chairmanship of S. S. Fowler, the Session of Thursday morning opened with a discussion on "Metallurgy in British Columbia." One of the most

interesting addresses on this subject was that of Horace Freeman, who pointed to the persistency of the problem of dealing economically with the fractious ores of the Kootenays. There were found here large bodies of ore containing lead, silver, zinc, copper and iron in varying proportions. The difficulty with which operators and smeltermen had been grappling for years was the extraction of these metals at a profit. The chief trouble was with the zinc and Mr. Freeman pointed out that, while metallurgy had made tremendous strides, it was backward in its knowledge of simple economic methods of handling this element when found complicated by its association with others. The fact that the proportion of zinc increased with depth in eastern British Columbia further aggravated the difficulty. There were some high-grade native-silver deposits contaminated by zinc sulphides. In lead smelting and in silver cyaniding the zinc interfered, in the first making infusible slags, and in the second keeping the silver from dissolving in the cyanide solution.

General reference was made to the smelting practices of the past and the present, none of which was satisfactory insofar as the peculiar ores of the Kootenay are concerned. What the British Columbia silver-lead-zinc miners wanted was a simple concentration of the silver-lead-zinc into one, the shipment of this and its treatment by a process that would yield the three metals in few steps. It was for research on the treatment of this ore that the Advisory Council for Scientific and Industrial Research had made its first grant in this Province and work along this line now was progressing.

Mr. Freeman emphasized the importance to the industry of finding a satisfactory solution of the problem. The financial assistance granted those engaged was insufficient. He was hopeful of success but lack of funds was a serious handicap. In view of the incalculable wealth tied up in these ores the amount expended in making them economically available should not be considered. It was his opinion that, if the Provincial Government were to expend a portion of the moneys it was laying out for the fostering of industries in helping to solve the puzzle of the fractious ores of the Kootenays, it would stand a much better chance of receiving returns on its investment.

The Smelterman and the Mine Operator.

Prof. H. N. Thomson, of the University of British Columbia, dealt with the relationship between the smeltermen and the mine operator in a manner that indicated his familiarity both with the difficulties of the former and the prejudices of the latter. To the mining man who ships ore for treatment, figuring that his return should be little short of the actual mineral values known to be contained in the ore, he advised greatly consideration for the difficulties very often encountered in the process of smelting. If it were possible, for instance, to run through a combination of zinc and copper ore and take away brass it would be a very happy condition. But the process of separating the various metals from the ore was not so simple as to permit this and he proceeded to describe some of the things that might occur to worry a smelterman in handling material containing combinations of zinc, silver, lead, etc. Under the circumstances it was to be expected that penalties should be exacted against some ores and that others should be so welcome as almost to warrant the payment of a premium therefore. A better appreciation of the problems met with in the handling of a smelter, he felt sure, would remove much of the misunderstanding prevalent among mining men. He looked forward to the day when the lion and the lamb would lie down together in amity but was careful to explain that he did not presume to refer to either one as the "lion" or "lamb." (Laughter).

A. G. Langley, referring to Mr. Freeman's experimentation, confirmed the statement that there were large quantities of ore waiting the solution of the problem of treating zinc-silver-lead combinations. The importance of the question could not be exaggerated. Thousands of tons of this material was to be found lying on dumps throughout the Kootenays. The smelter at Trail could not accept it. With the high freight costs it could not be forwarded to smelters south of the line or any great distance. Therefore the progress of Mr. Freeman's work was of first interest and concern to the miners of the eastern section of the Province and he hoped that the Government would be able to see its way clear to extent further financial aid.

Referring to the observations of Mr. Freeman it was stated by E. E. Campbell, who has left the Granby Consolidated Mining & Smelting Company's employ to take a position in Arizona, that his experience in smelting practice at Anyox was that scientific principles could not always be strictly adhered to with success. In practical work a "cut and fit" policy had to be adopted. Of course the basic principles always were there, but it was a fact that things were done in actual economic metallurgy to which the scientist would not give his approval but which got results. There was a problem in treating the ore of the Hidden Creek Mine which was being made the subject of research with every prospect of success. A small mill had been installed to carry out this work and there seemed to be little doubt that the difficulties in question would be overcome.

Coal Industry of Vancouver Island.

"The Coal Industry of Vancouver Island" was the subject of an address by Thomas Graham, general superintendent of the Canadian Collieries (D) Ltd., before a joint luncheon of the Mining Institute and the Associated Boards of Trade of British Columbia. In view of the special interest attaching to his remarks in the West, because of the agitation for an official inquiry into the cost of coal, Mr. Graham's speech is elsewhere in this issue, reproduced in full.

Fuel Supply, Distribution and Substitutes.

In the afternoon there was a general discussion on "Fuel Supply, Distribution and Substitutes." This was introduced by a paper by George Wilkinson, general manager of the Pacific Coast Coal Mines Ltd. who covered much the same ground as did Mr. Graham. Mr. Wilkinson, however, dealt in more detail with underground working costs, production per man, and the number of handlings to which the product was subjected before reaching the consumer. He showed that costs on the Pacific Coast were higher than in most other fields and the production per man per shift very low comparatively speaking. Some surprise was expressed that the consumer insisted on obtaining the very finest lump-coal, at the highest prices, in order simply to give himself the pleasure of going into the cellar and, in breaking up the lumps, converting the material into "run-of-the-mine" product.

Alexander Sharp gave a paper in which he referred to the possibility of increasing the production in this Province by the greater use of mine machinery. He stated that there was less of this in use in this Province than anywhere else on the Continent and that, if the operators kept up to date in this respect, the production per man might be expected to grow.

To this it was stated by Charles Graham, of the Canadian Collieries, that his Company had introduced cutting machinery at Comox. That had all these appliances that could be used. As a matter of fact the seams of the Island were not sufficiently even to make such machinery adaptable.

Discussing the possibility of recovering the very fine volatile material at present wasted in washing, Thomas Graham said that the Minerals Separation Company now was experimenting with this class of the product of the Canadian Collieries. The results heretofore had not been altogether satisfactory but those engaged were confident that they would be able to work out a method for a substantial recovery by this process.

The Advisory Function of the Institute's Members.

An excellent paper on "The Relations of Geology to Mining in British Columbia" by Dr. S. J. Schofield and an address by H. Mortimer-Lamb on "The Relation of the Institute to the Government" marked Friday's Session. Dr. Schofield pointed to the geological characteristics of the chief mining districts of the Province and indicated other sections giving promise of reward to the prospector. Mr. Lamb urged that the members of the Institute put forth greater effort to co-operate with the Provincial Government in the formulation of its mining policies and in its administration of mining laws. Until the Institute took itself seriously in this respect it could not be expected that the Administration would take it seriously. The function of the organization was to assist, by friendly unbiased counsel, in the preparation of legislation that would stimulate the industry.

The Annual Dinner.

In the evening there was a dinner presided over by the retiring chairman, E. E. Campbell. The latter was tendered a hearty vote of thanks for his faithful service while in office. He was formally succeeded by Col. J. Leckie, C.B., C.M.G., D.S.O., who brought the proceedings to a close by delivering a most interesting illustrated lecture on "Campaigning in Northern Russia."

GEOLOGICAL INVESTIGATIONS IN ONTARIO AND QUEBEC.

(Part "E" Summary Report, C. G. S. 1919.)

Port Arthur and Nipigon District.

T. L. Tanton reports on investigations along the shore of Lake Superior between Port Arthur and Nipigon, including mineral deposits in Dorion township and vicinity and the Silver Islet Mine, which since Mr Tanton's visit has been re-opened. The Survey plans a detailed geological map, no dependable map of the district being yet compiled. Mr Tanton's work was preliminary to the making of this proposed map.

Ontario Oilfields.

M. Y. Williams report on the oilfields of Elgin, Essex, and the southern part of Kent Counties, Ontario, and his work in 1919 was undertaken to round off previous work. In regard to the Tilbury Field, Mr Williams notes that wells were abandoned prematurely in order to realise on the well casing for which high prices were offered early in the war period. It is stated that wells producing as much as 200 barrels of oil per month were abandoned in order that the casing in the wells might be sold. Salt water a short distance below the oil has been a serious problem in this field, and "according to the best available opinion, it was largely mismanagement of the salt water that caused the field to be closed down prematurely."

Oil in a Syncline of the Trenton.

An interesting note is one the occurrence of oil in a syncline of the Trenton Formation in Kent County, which is well illustrated by diagrams. This occurrence is stated by Dr. Williams to be of unusual interest, as it is the only commercial production from the Trenton in Canada, and because the oil occurs in a syncline. Credit is given to Mr. E. P. Rowe for accurately locating the syncline and deducing that it was the place where the oil would be found. This particular formation is free from water, or only partly saturated, and under such conditions, Dr. Williams suggests "the synclines should be sought, rather than the anticlines."

Townships west of Kirkland Lake, Ontario.

H. C. Cooke reports on examination of a strip of country 12 miles wide between the Matachewan and Kirkland Lake districts, which was not previously mapped. It was desired to ascertain whether this strip included the gold-bearing porphyries of Matachewan and Kirkland Lake, but the geological examination proved disappointing from an economic standpoint. No body of the porphyries mentioned was found at any point in the area, although carefully searched for.

Hurried examination of reported platinum finds in the western part of Otto township did not result in any valuable information, but the locality is possibly to be regarded as a good one for prospecting.

Mineral Deposits in the Ottawa Valley.

M. E. Wilson reports on graphite in the Renfrew district, pyrite in the Calabogie district, molybdenite in the Renfrew-Calabogie district and on celestite in Bagot township, Renfrew Co. This work is in continuation of the field work of the previous six years. An extended account of the occurrence of graphite at the important Black Donald mine is given, and the genesis of the ore body is discussed.

Peat Bogs.

A. Anrep has prepared a tabulation showing area, estimated contents and depth of thirteen peat-bogs in Ontario and Quebec, three of which, Thedford and Nellie Lake in Ontario, and Clair in Quebec, about ten miles east of Quebec City, contain in each case over three million tons of fairly well hummified peat-fuel. A separately published bulletin is to be issued which will contain a more detailed description with maps and diagrams.

THE LATE MILTON R. JENNINGS

Milton R. Jennings, Editor and Managing Director of the "Edmonton Journal", whose death has been so generally regretted by friends all over Canada, became an Associate Member of the Canadian Mining Institute in 1911, and was a valued member of that body. The "Daily Colonist" of Victoria, whose comment may be regarded as typical of Mr. Jenning's associates in journalism, states that by his death Canada loses one of its soundest writers, a man who "was an influence for great good in Alberta and wherever the newspaper he controlled circulated. He had the public welfare closely at heart, and will be sadly missed in the journalism of the Dominion."

A visitor to Toronto just now is Professor Gaichi Yamada, Assistant Professor of Metallurgy in the Kyoto Imperial University, who is touring Canada to study mining methods and processes.

Northern Ontario Letter

THE SILVER MINES.

The Cobalt District.

A wage reduction of 75 cents a day, or about 15 p.c., went into effect in the Cobalt district on February 16th and has been the cause of controversy. The workers technically admit the justification for the cut, but asked that it be spread over a period of three months, as stated in last week's Journal. They have intimated an intention to ask for a Board of Conciliation. However, insofar as this application was not made before the date of the cut, the reduction went into force, and should a Board now be requested and granted, the question would not deal with the matter of reducing the pay, but would be a question of whether an increase to the old rate should be made, or not. The mining companies point to the several closed-down mines as evidence of the difficulties under which the silver mines are being operated, and believe a Board of Conciliation would only be wasting its own time and that of the witnesses. Not only that, but it would magnify all grievances whether real or imaginary and without any visible material benefit.

At any rate, the reduction in pay is in operation, and the labor representatives themselves declare it is their belief that the best they could hope for would be a "moral" victory. There has been no intimation or thought of a strike, and such a development is not under consideration. The men are desirous only of vindicating their own point of view.

In regard to the proposal of the Ontario Government to increase the Mining Profit Tax, the mining companies, mine workers, and citizens in the mining districts are joining in a general protest against the proposal. They point to the fact that already these mines are paying an average of a little over ten per cent. of their net profits in taxes, and that this is actually double the maximum regarded as reasonable by a Royal Commission which recently dealt with a similar controversy. The various organizations throughout the district of Temiskaming, including the Town Councils, Boards of Trade, Associated Boards, the G. W. V. A., etc., are passing resolutions and addressing protests in general to Premier Drury as well as Hon. Harry Mills, Minister of Mines. A precis of the Bill is appended.

In the lateral work at the 410-ft. level of the Chambers-Ferland mine, some very rich ore has been encountered. The vein is about two inches in width, and in places contains values running as high as 5000 ounces of silver to the ton. The higher grade ore is being bagged, while the low-grade ore is being shipped to surface through the leased shaft of the Right-of-Way Mines from where it will be shipped at a later date to the customs plant.

At the third level of the Hudson Bay Mines, a large tonnage of medium-grade ore is being developed. The Company borrowed some $20,000 last Autumn with which to carry on work during the Winter. A force of about twelve men is employed, and the indications are that shipments will be resumed in the early Spring. The location of the ore now being developed promises definite extension of the life of the mine. At the time of writing, the result of a number of assays is being awaited.

Ore shipments from Cobalt during January were comparatively small, the following being a summary, supplied by Mr. A. A. Cole.

January ore shipments over I. & N. O. Railway.

SILVER ORE

Cobalt Proper.	Tons.
1. Beaver	30.00
2. Coniagas	62.91
3. Dominion Reduction	67.50
4. LaRose	88.03
5. McKinley-Darragh	84.07
	332.51

The above shipments were made to the following companies:—

CANADA

Deloro Smelting & Refining Co., Deloro	73.74
Coniagas Reduction Co., Thorold	188.27

UNITED STATES.

American Smelting & Refining Co., Perth Amboy	70.50
	332.51

PRICE OF SILVER.

Jan. 6th.	Highest	68.625
Jan. 31st.	Lowest	59.875
	Average	65.950

In connection with the transportation problems of the mining districts adjacent to the main line of the Temiskaming and Northern Ontario Railway, the chairman, George W. Lee, told a large audience in Cobalt, it was the intention of the Ontario Government to extend the railway. If the local organizations could settle their minds upon something within reason and direct a united request, he felt confident the Premier would be willing to authorize the extension asked.

Elk Lake and Gowganda.

The scheme, promoted by mining interests chiefly from the West Shiningtree and Fort Matachewan gold areas, to encourage the Government to construct a 90-mile railway from Westree to Swastika was not acted upon by the Associated Boards of Trade of Temiskaming, and favorable action resulting from the proposal is not immediately looked for.

THE GOLD MINES.

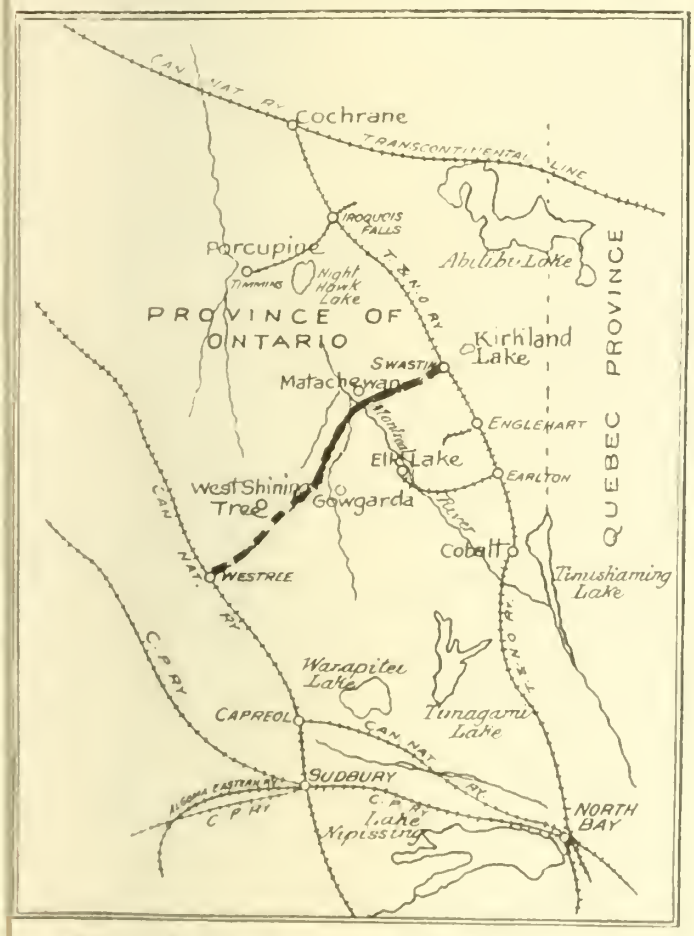
The Porcupine Field.

In an interview with A. F. Brigham, your correspondent was informed that labor is abundant and no further difficulty is expected in this respect. As many as one hundred men, seeking employment, have had to be turned away in a single day. Mr. Brigham believes that with a full supply of hydro-electric energy in the early Spring, probably within the next thirty days, no difficulty will be experienced in getting the required number of men to increase operations so as to handle upwards of 3,000 tons of ore daily. This will compare with an average of only a little over 1,700 tons during the past year, owing to labor supply being scarce during the first nine months, and a power shortage during the closing quarter.

The Hollinger Consolidated has an extensive program mapped out for the coming Summer. The question of housing an increase of about fifty per cent. of its employes is one which has to be dealt with this year. The construction of dwelling houses has been held in abeyance as long as possible owing to the high cost of material. Mr. Brigham declared such construction was not a good investment at present prices, but adequate steps would be taken to provide the necessary accommodation.

Reports are current that the McIntyre-Porcupine

has decided to make arrangements to increase its milling equipment to at least 1000 tons daily, as compared with its present capacity of 600 tons daily. This would enable the company to produce upwards of $3,000,000 a year as compared with a little over $2,000,000 yearly with the present equipment. Net profits have heretofore amounted to about fifty per cent of the total annual output, and by increasing these profits to around $1,500,000 a year, the earnings would amount to about 41 per cent on the issued capital of 3,600,000 shares. It is officially announced that the coal-mining enterprise, that is the Blue Diamond coal mine in Alberta which the McIntyre and Temiskaming



Route of Proposed 90-mile Link between the Canadian National and the T. & N. O. Rlys.

Company purchased jointly, is developing satisfactorily and an operating profit was realized during January.

At the Dome Mines a considerable amount of work has been carried on in connection with placing the entire mill in shape for full operation within the next thirty or forty days. With the ore-outlet system completed, and the mill tuned up, and with a large quantity of broken ore waiting to be hoisted, nothing stands in the way of operations at maximum capacity once the necessary power is made available.

Interests identified with the properties in the northeastern part of Whitney township which are joining in a consolidation to be known as the Porcupine Associated Gold Mines were in South Porcupine this week. The merger includes the Three Nations, La Palma, Dominion Porcupine and Jermey Veteran claim.

Kirkland Lake District.

Within the next few weeks, funds with which to carry on operations at the Tough Oakes mine will be available. A meeting is to be held within the next week or so for the purpose of completing the technical arrangements which will bring the Tough-Oakes into the merger with the Aladdin-Cobalt and the Burnside properties under the name of the Kirkland Lake Proprietary, 1919, and work will then proceed. It is believed, about three month's work will suffice to place the mine in shape to commence production. The ore already in sight is adequate to keep the mill running three or four months, while the proposed development on both the Tough-Oakes and the Burnside is expected to assure steady production from that time forward.

Although pumping operations were stopped some time ago on the Tough Oakes, a pump was installed on the Burnside property, and as the underground workings of the two mines are connected, no water has been allowed to remain in either one.

The Northern Ontario Light and Power Company has been approached on the question of erecting a power-transmission line from the sub-station at Kirkland Lake east to Mud and Crystal Lakes. Terms on which the work will be done have been quoted and it is thought the several companies owing property in that district may join in having the line constructed.

A meeting of the directors of the Crystal Lake-Lebel Gold Mines is being held this week in New York for the purpose of making arrangements to finance a scheme of exploration work. It is proposed to provide $50,000 with which to carry on the preliminary work so as to determine the extent of the development warranted by the veins proved on the property.

Larder Lake District.

Peter Kirkgaarde, of Toronto, has made application for an injunction to prevent the proposed deal whereby the assets of the Goldfields, Ltd., are to be sold to the Associated Goldfields, or the 30,000,000-share corporation known as the Canadian Associated Goldfields, Limited. Action has been taken as a shareholder among the minority holders who are averse to trading the assets of the property for what they claim to be watered stock on the new corporation. The solicitors for the applicant have expressed a desire to have the officers and directors of the Goldfields, Limited, up for a hearing at as early a date as possible.

It is also learned a petition has been signed by some 52 shareholders of the Goldfields, Limited, and presented to Premier Drury and Hon. Harry Mills, Minister of Mines, asking for a Government investigation into the affairs of the company, and the alleged evasion of certain phases of the law.

AMENDMENTS PROPOSED TO ONTARIO MINING TAX ACT INCREASING TAXATION ON MINING PROFITS

Following is a precis of a government bill, introduced by the Minister of Mines, at the current session of the Ontario Legislature. Determined opposition to the extent of this Act, so far as the taxation clauses are concerned, is being shown in northern Ontario, and business men have combined with the mining companies and their employees in protest against its unfairly discriminatory character.

The Act proposes an increased rate of taxation on profits as follows:

In other than nickel or nickel-copper mines four per cent on the excess of annual profits above $10,000

and up to $1,000,000, and seven per cent on the excess over $1,000,000.

In nickel-copper mines, five per cent on the excess of annual profits above $10,000 and up to $1,000,000, and seven per cent on the excess over $1,000,000.

Further provisions cover regranting of claims forfeited because of taxation arrears, at any time before 1st January, 1922, upon payment of taxes, costs and a penalty of ten dollars for every claim so regranted.

Forfeited claims shall not be open for staking or recording until the lapse of one year from date of forfeiture, or until declared open by Order-in-Council. Forfeited claims are to be held by the Crown for one year, subject to a right of redemption by making the required payments. After lapse of one year, if claims are not redeemed, they revert unconditionally to the Crown.

Sudbury Notes

C. I. M. & M. to Consider Mining Profits Taxation.

The Sudbury branch of the Canadian Mining Institute will consider the question of mining taxation at its next meeting scheduled for Feb. 26. Particular attention is to be given to the proposal of the Ontario Government to raise $100,000 more revenue by an increased tax on the mines of the province and in this connection has invited Balmer Neilly, secretary of the Ontario Mining Association, as speaker. Prof. J. L. Goodwin, late of the Faculty of Applied Science, Queens University, and who has been conducting prospectors' classes throughout the province under the auspices of the Ontario Bureau of Mines, will also be a speaker.

So far no move has been taken in this district to voice opposition to the increased tax proposal. Though according to the figures on mineral production issued with the annual report of the Mines department, the Sudbury nickel belt leads both the gold and silver camps in the value of production. Only three mines will be to any extent hit, and either one of them, could if the market was better, pay the whole $100,000 and hardly miss it. However, there are other small struggling properties in the district, including a couple of promising gold camps, and if the new tax scared away outside capital, this district would feel it as well as Porcupine, Cobalt and the others.

MONTREAL METAL QUOTATIONS.

Following are fair average prices for ingot metals (in less than car-load lots) at Montreal:

	Cents per pound.	
	Feb. 16th.	Feb. 23rd.
Copper, electro	17¾	17½
Copper, castings	17½	17¼
Tin	38	37½
Lead	6¼	6
Zinc	7¼	7½
Aluminum	35	35
Antimony	7½	7½

TORONTO COAL PRICES.

Toronto, Feb. 23. — There have been slight stiffenings of prices in two lines of coal during the past week. Smokeless coal is now quoted at from $8 to $8.50 and slack at $1.50 to $2.75. Lump still ranges all the way from $2.50 to $3.75 at the mine. Smokeless is around the $8.50 mark. There is still considerable difficulty in moving anthracite coal and the independents are getting but little over circular prices and in many cases having difficulty in moving coal even at circular prices. It is interesting to note that the prices being quoted for contract coal are from 75 cents to $1 above present spot prices, which proves that the present spot prices do not represent the true value of coal.

TORONTO MINING STOCK QUOTATIONS.

Quotations on Active Stocks on Standard Stock Exchange for Week ending 12 February, 1921.

Silver.	High.	Low.	Last.
Adanac Silver Mines, Ltd.	17⅛	17⅛	17⅛
Bailey	4	3¼	4
Beaver Consolidated	41	37	38
Cobalt Provincial	39	37	37
Coniagas	1.80	1.80	1.80
Crown Reserve	18	17	18
Great Northern	1¾	1¾	1¾
Kerr Lake	3.10	3.10	3.10
La Rose	30	28½	28½
McKin.-Dar.-Savage	30	29½	30
Mining Corp. of Can.	1.25	1.18	1.18
Nipissing	9.25	9.00	9.25
Peterson Lake	8¼	7	8
Temiskaming	27	26¾	26¾
Trethewey	18½	16¾	16¾
Gold.			
Apex	2¼	2¼	2¼
Atlas	27½	25	25
Dome Extension	60	50	60
Dome Lake	3¾	3¾	3¾
Dome Mines	19.00	16.00	16.50
Gold Reef	4⅜	3½	4
Hollinger Cons.	6.98	6.51	6.55
Hunton Kirkl'd G.M.	10½	10½	10½
Inspiration	4	4	4
Keora	20½	16½	19
Kirkland Lake	56	51	51½
La Palm	4	4	4
Lake Shore M. Ltd	1.21	1.19	1.19
McIntyre	2.02	1.92	1.93
Newray Mines, Ltd	7⅞	7½	7⅞
Porcupine Crown	23½	20½	22
Porcupine V.N.T.	23	21	21
Preston East Dome	3⅞	3½	3⅞
Schumacher	27	25	25½
Skead	49	25	25
Teck-Hughes	11	10	11
Thompson Krist	7⅜	7	7¼
West Dome	8⅞	7⅜	8⅞
West Tree Mines Ltd.	5½	5⅛	5⅛
Oils.			
Ajax Oil	32	28½	32
Eureka	20	20	20
Rockwood Oil, Gas	3¼	2¾	2¾
Vacuum G.	18½	15	16¾

TORONTO METAL QUOTATIONS.

	February 23rd
Copper, electro	18
Copper, casting	17¾
Tin	42
Lead	7
Zinc	8
Aluminum	32
Antimony	8

The Pioneer and Pillar of Civilization

By ALEXANDER GRAY, Montreal.

To ever-so-many well-meaning and perfectly fair-minded persons the world over, mining is taboo.

Off-hand discussion of the whys and wherefores of this wide-spread antipathy toward what has to do with the extraction of minerals from the Earth cannot alter the fact.

"A Mine! Not with my money!" is a familiar demurrer on the part of business men and bankers.

The glib generalization is: "More money has been spent in and upon mining fields than has ever been taken out of them."

So the mass of those in a position to ascertain the true worth of profit derivable from mineral resources, by diffidence or downright default, remained aloof while more adventurous and too frequently sinuous speculators have had what they term "the mining game" to themselves — the rasher element of the public as a rule being victimized. How much confidence and wealth have been dissipated by get-rich-quick "mining" schemes, as a consequence, never will be fully determined. All the Blue Sky Laws that can be placed upon statute books would not safeguard the willingly gullible. Inherent in human nature is the speculative element; were it not for it, the arts and sciences would be askew, wealth and industry minor quantities in a primitive setting.

Advanced thinkers, the greatest of the economists, at the moment are emphasizing that "mining is one of the two basic industries of man"; that "the other primary pursuit of the human race is agriculture"—but the latter is now almost entirely dependent upon the manufactured tools made from minerals". Of course, the Secretary of the Canadian Forestation Society did not exaggerate when he declared that "as a filler of pay envelopes and a provider of jobs, the forests of Quebec and Ontario are worth all the Cobalts and Porcupines ever uncovered between now and doomsday". He spoke as he thought and did not mean to be invidious; yet he merely re-echoed the prejudicial view that mining is somewhat of a non-essential, whereas the saner opinion of the better informed is that "politically and economically, mining is the most important business in which we are engaged. It is an industry which concerns the welfare and deserves the attention of every citizen." Without mining, agricultural expansion would not have made land values what they are, and Canadian forests would be more or less of a nominal asset instead of an assured source of wealth. To argue, however, that these forests excel in "worth" all the precious metals discovered or to be discovered in Canada, suggest that the gentleman who thinks so is too close to his subject to appreciate the relationship of mining to other industrialism. Another form of horizontal deduction was that expressed by Mr. Isaac F. Marcosson with reference to South African affairs. There—south of the Limpopo and Crocodile rivers, forests other than wattle plantations — are inconsequential — so they do not enter into this by Mr. Marcosson:

> "Last year the Union (of South Africa) produced £35,800,000 in gold and £7,200,000 in diamonds. The total mining production was, roughly, £50,000,000. This mining treasure is surpassed by the agricultural output, of which nearly one-third is exported. Land is the real measure of permanent wealth. The hoard of gold and diamonds in time becomes exhausted, but the soil and its fruits go on forever."

Again is mining relegated to the useful but doubtful quantities. Undoubtedly the land is immovable property—and until eternity. Because of the diamond, gold and coal fields of South Africa, owners of the land have a home market that takes two-thirds of their products. Australia, New Zealand and the Argentine compete with the farmers in beef and mutton. Otherwise, South Africa owes its progression to mining. Preferably, earlier colonists would have kept their country pastoral. They had the land lust and physiques developed in the open. Removed from racial rivalries other than with native tribes — all but one of which they mastered — they were "Nature's Noblemen" of a kind-fond of horseflesh, adept with the gun, raised cattle and sheep rather than follow fancy farming, trekked with their wool, traded their surplus crops with storekeepers, did their own tanning and wore veldschoen. When a prospector reported having found gold adjacent to what became the Witwatersrand Gold Fields, President Pretorious promptly had him deported as a menace. The agricultural people wished to evade the influx of a population inimical to them. Mining was not to be encouraged then as now by those who did not comprehend its potency in procuring working capital. Mauch who discovered gold in 1868, in the Eastern Transvaal, was regarded as a half-crazed prospector. More gold was reported in 1870, 1873 and 1882. When diamonds were found in 1867, and gold at the Witwatersrand, in 1884 in quartz and in 1885 in the pebble beds distinctive of the greatest of gold fields, South African civilization rapidly developed on a metallic basis, Kimberley diamonds having furnished initial working capital. The diamond and gold mines were the real pioneers of industry; for unequal distribution of rainfalls and recurring epidemics among cattle made precarious the occupation of farming. Billions of dollars in diamonds, more billions in gold, taken out of the earth necessitated great activity on the surface of the land.

Discoveries of diamonds, the rush to Barberton; then the Rand, substituted railways for the ox wagon. Conceding to land its everlasting worth, South African history of the past half century clearly demonstrates that man's ascent dates from the day he dug into the earth and secured materials from which he made the plow, the hoe, the ax and the sword, the coming of metal tools; that science and art were crude until metal devices formed from the earth's products", as well as the more precious metals availed of as money, were acquired in quantity.

Recently a writer familiar with details of industrial evolution as influenced by mining declared "it was the mines of England and Scotland that transformed the small British nation into the greatest of world surprises during the nineteenth century." Likewise it was mining developments which gave the United States the lead in iron and coal in the latter half of the century. When Germany got hold of the iron

ores of Alsace-Lorraine, it passed Great Britain in 1905 and became a world power. Floyd W. Parsons, writing in *The Saturday Evening Post* on this subject, argues that the struggle between Germany and Poland is over the Silesian coalfields, the greatest on the continent of Europe. Commercial domination of mining areas is going to be the test of national strength. Mr Parsons maintains that "the control and exploitation of the world's minerals during the next fifty years will provide the greatest political problem that confronts the nations of the earth."

In a single generation, Mr. Marcosson to the contrary, diamonds and gold gave to South Africa a larger space upon the map. It was not the trek-oxen that did it. Nor was it the settlers upon the prairies of the United States who pioneered the Far West. The westward movement began in 1848, when John Marshall discovered gold in the foothills of the Sierra Nevada nine days before Mexico ceded California. Marshall "struck it rich" on January 24th. The treaty of Hidalgo, by which the United States took over California, was signed on February 2nd. Of course the finding of gold was not known to Mexico. Otherwise, as Mr Parsons assumes, California might not so soon have dropped into Uncle Sam's lap. In three years, California was producing gold at the rate of $80,000,000 per annum. Nobody thought of acquiring agricultural or fruit lands in California. Within twenty years, the States from the Rocky Mountains west underwent exploitation for minerals. Farming followed closely in the wake, and yet it was mining that brought the railways and it was the railways that made farming possible. From California, the whole Pacific coast came under the scrutiny of the adventurous prospector. British Columbia got some of the overflow, and later the Yukon and Alaska. It was an Australian, fresh from California, who discovered gold in Australia in 1851. Until mining drew prospectors and capitalists to the Pacific, Canadian railways, telegraphs and coastal steamers were in nebulae. Gold lured men — and the finding of gold prefaced other discoveries, in many instances transcending those of the so called precious metals.

The Mining Engineer it was who realized the importance of such basic minerals as copper and iron. Marshall and Comstock are romantic figures. Years after California and Nevada began to yield metallic wealth, the idea germinated that there was a climate there capable of producing fruits for the nations. For as many years following upon the discovery of the Barberton and Witwatersrand gold fields, and of the Kimberley diamond fields, South Africa was a long way from being self-sustaining as to foodstuffs. It was one of my old partners, "Tom" Cue, who found gold in the Murchison country in Western Australia. Originally he was a "sheep man." Australia would be a country of sheep "runs" today in all probability were it not for the Ballarat and Bendigo gold fields and "squatter sovereignty" might have continued unmolested by statute tinkerers.

Eliminate mining from British Columbia and the breakfast-table necessaries would be in scant supply. The same applies to the Canadian Maritime Provinces. When La Salle, Champlain, and the other voyagers sought Canada, they were not looking for suitable soils. Columbus was after the wealth of the Indies

Cortez, Pizarro, and the other pirates, went after loot, not land. Phoenicians did not go to Cornwall for the flora of the Scilly Isles. They began to mine. As a consequence, Cornish miners and their Saxon prototypes are accredited with having introduced the real art of mining. The "Cousin Jack" and the "Taffy", as the Welshman is known, often have been ahead of the flag with the pick.

It may be sacrilege to say so, but the name Logan will live longer than Laurier; Dawson than Macdonald; Dana than Morgan. Unbiased statisticians hold that, measured by tonnage, the American mining industry is the biggest industry not only in the United States but in the world. Mr. Parsons states that the total products of the mines form 60 per cent of the normal freight carried by all the railways of the United States. It is owing to this that prevailing freight rates are so prejudicial to mining. President Warren of the Consolidated Mining and Smelting Company dwelt upon this in his remarks before the Canadian Tariff Commission. From now on margins of profit will be smaller. Economies must be all the greater. Jackling divined the worth of the porphyry coppers, but Ballot and Sulman put the recoveries where they never had been before — which is no disparagement of the Callow practice. Without flotation, the copper outlook would be blue-back. Low-grade porphyry rocks are the mainstay of the trade in the States, which control 60 per cent of the world's copper output. Canada's low-grade copper ores, and what is associated with nickel, have a larger mission, as evidence of which we have the appointment by the Granby Company of Professor J. Austen Bancroft of McGill University as Assistant General Manager. Desiring mass production and assurances as to the mining position, Dr. Bancroft has been chosen by this corporation. The appointment will be hailed with intense satisfaction. Not only has Dr. Bancroft served with distinction Canada's greatest University, but his field work for Granby, and on behalf of British Columbia mining corporations in general, has been a source of inspiration and enlightenment. That the McGill Faculty granted Dr. Bancroft a year's leave of absence, for the new duties to be assigned to him, was a graceful acknowledgement of the compliment paid to its Geological Department. Granby chiefs know what is coming in metal markets. Canada cannot afford to be caught napping when the United States plan expansion and are now actually producing more copper than all other nations combined. Moreover, besides the domestic production, the United States import nearly one-half of all the other copper for final treatment at American refineries. Altogether, the States control approximately 80 per cent of the world's copper production, predominate in iron and steel, excel in coal output — and the mineral industries provided the remunerative incentive for agriculturists, who have surer footing than when cattle ranching practically monopolized the ranges of the West.

But it was gold and silver that quickened the pace. To-day every natural resource is being taken into account, Canada having an object lesson in the decision to treat the masses of lower-grade iron ores in the States bordering on Canada. Heretofore much of the iron-ore mined has been selected and of higher grade. The plan now is to deal with the larger quantities of 30 per cent rock, never previously considered commercially. For this there is a precedent established in the utilization of lower-grade porphyry-copper rocks, from which flotation made possible recoveries in keeping with large capital investments. Until the porphyries appeared upon the stage, Nevada had existed upon its silver and gold mines. When Colorado disclosed the mineral wealth of Leadville, Central City, the San Juan and Cripple Creek, cattle roamed on a thousand hills and there was no thought of the productivity of the soils, or adaptability of the climate. Wyoming also was devoted to stock-raising, but its minerals, especially oils gave it an exalted status. The Mormons found a paradise in the Utah Valley, but mining raised the steam. Pennsylvania, Ohio, West Virginia and Tennessee developments are too familiar to require emphasis. Alabama iron and coal made that state a hive of industry. Arizona minerals, and more recently California oil, swelled the credits of those states. Nearer home, Cobalt, the Montreal River, Porcupine and Kirkland lake hastened settlement and enriched the province.

Mineral resources — soils if you will — cannot be denied priority in our national economies. Mr. Parsons, whose study of the subject has been so well told, claims "the early progress of man is really a tale of the gold of Ophir, the silver of the Laurion Mountains of Greece, and the copper of Mount Sinai in Egypt. Hannibal could not have conquered Rome were it not for metals obtained from the mines of Iberia. When Carthage and Rome fell, mining ceased, the dark days of the middle ages began, civilization halted." Arabs had centuries of advantage in trading to Sofala and beyond — and the Zimbabwe ruins attest their adventures in gold mining in what now is Rhodesia — a British possession sustained by mining enterprises. Phoenicians and Saxons exploited mining areas. Our own nickel kept the flag flying. History is replete with proofs that the more strenuous, profitable life originated with mining — and the sooner Canada enlarges its views and appraises its natural mineral resources, the sooner will needed capital be forthcoming.

A DINOSAUR IN THE UPPER CRETACEOUS OF ALBERTA.

Bulletin 120 of the Canadian Geological Survey is a technical description by Lawrence M. Lambe, of *Hadrosaur Edmontosaurus*, a dinosaur whose remains have been found in the Upper Cretaceous of Alberta on the Red Deer River. The report consists chiefly of anatomatical comparisons of the unusually shaped skull of the specimen with that of skulls of other members of this extinct genera.

TECHNICAL JARGON.

The way not to write technical reports is well illustrated by a South Australian press announcement, in which a mining expert is made to say: ".... You have a property of considerable value, and what I saw warrants a good development of very rich cubicular galena and carbonates, with gossan intermixed." There was more to the same effect; but "cubicular galena" looked so like the fabled ass in the lion's skin that after trying in vain to get any further than "cube," "cubic," "cubical," one turned to Webster in despair. Yes! There it was: "Cubicular—belonging to a bedroom." Really, the indelicacy of this kind of thing is not to be justified, even by the discovery of a new variety of lead sulphide. — Chemical Eng. and Min. Review, Melbourne.

The Canadian Miners' Buying Directory.

Acetylene Gas:
Canada Carbide Company, Ltd.
Canadian Fairbanks-Morse.
Prest-O-Lite Co. of Canada, Ltd.

A.C. Units:
MacGovern & Co.

Agitators:
The Dorr Co.

Air Hoists:
Canadian Ingersoll-Rand Co., Ltd
Mussens, Limited.

Alloy and Carbon Tool Steel:
H. A. Drury Co., Ltd.
International High Speed Steel Co., Rockaway, .
Peacock Brothers Limited.

Alternators:
MacGovern & Co.

Spielman Agencies, Regd.

Aluminium:

Amalgamators:
Northern Canada Supply Co.
Mine and Smelter Supply Co.
Wabi Iron Works.

Antimony:
Canada Metal Co.

Antimonial Lead:
Pennsylvania Smelting Co

Arrester, Locomotive Spark:
Hendrick Manufacturing Co.

Arsenic White Lead:
Coniagas Reduction Co.

Assayers' and Chemists' Supplies:
Dominion Engineering & Inspection Co
Lymans, Limited
Mine & Smelter Supply Co.
Pennsylvania Smelting Co.
Stanley, W. F. & Co., Ltd.

Ash Conveyors:
Canadian Link-Belt Company

Ashes Handling Machinery:
Canadian Mead-Morrison Co., Limited
Canadian Link-Belt Co., Ltd.

Assayers and Chemists:
Milton L. Hersey Co., Ltd.
Campbell & Dysell
Ledoux & Co.
Thos. Hays & Son
C. L. Constant Co.

Asbestos:
Everitt & Co.

Balls:
Canadian Foundries and Forgings, Ltd
Canadian Steel Foundries, Ltd.
Hull Iron & Steel Foundries, Ltd.
Fraser & Chalmers of Canada, Ltd
Peacock Brothers Limited.
The Electric Steel & Metals Co
The Wabi Iron Works.
The Hardings Conical Mill Co

Ball Mills:
Hardinge Conical Mill Co.
Hull Iron & Steel Foundries, Ltd.
Mine and Smelter Supply Co.
Fraser & Chalmers of Canada, Ltd.
The Electric Steel & Metals Co
The Wabi Iron Works.

Balances—Hoisser:
Canadian Fairbanks-Morse Co., Ltd
Mine and Smelter Supply Co

Babbit Metals:
Canada Metal Co.
Canadian Fairbanks-Morse Co., Ltd.
Hoyt Metal Co.

Ball Mill Feeders:
Fraser & Chalmers of Canada, Ltd
Hardinge Conical Mill Co.
Hull Iron & Steel Foundries, Ltd

Ball Mill Linings:
Hardinge Conical Mill Co
Hull Iron & Steel Foundries, Ltd.

Belting—Leather, Rubber and Cotton:
Canadian Fairbanks-Morse Co., Ltd
Canadian Link-Belt Co., Ltd.
The Mine & Smelter Supply Co
Northern Canada Supply Co.
Jones & Glasco.

Belting:
R. T. Gilman & Co
Gutta Percha & Rubber, Ltd.

Belting—Silent Chain:
Canadian Link-Belt Co., Ltd.
Hans Renold of Canada, Limited, Montreal, Que
Jones & Glessco (Regd.)

Belting (Transmission):
Goodyear Tire & Rubber Co

Belting (Elevator):
Goodyear Tire & Rubber Co

Belting (Conveyor):
Goodyear Tire & Rubber Co.
Gutta Percha & Rubber, Ltd.

Blasting Batteries and Supplies:
Canadian Ingersoll-Rand Co., Ltd
Mussens, Ltd.
Northern Canada Supply Co.
Canadian Explosives, Ltd.
Giant Powder Co. of Canada, Ltd.

Bluestone:
The Consolidated Mining & Smelting Co

Blowers:
Canadian Fairbanks-Morse Co., Ltd
MacGovern & Co., Inc.
Northern Canada Supply Co.
Fraser & Chalmers of Canada, Ltd.

Boilers:
Northern Canada Supply Co.
Canadian Ingersoll-Rand Co., Ltd
Marsh Engineering Works
MacGovern & Co., Inc.
R. T. Gilman & Co.
Fraser & Chalmers of Canada, Ltd.
The John Inglis Company
Wabi Iron Works.

Blue Vitriol (Coniagas Red):
Canadian Fairbanks-Morse Co., Ltd

Borts and Carbons:
Diamond Drill Carbon Co.

Boxes, Cable Junction:
Standard Underground Cable Co. of Canada, Ltd
Northern Electric Co., Ltd.

Brazilian Rough Diamonds:
Diamond Drill Carbon Co

Brazilian Mica:
Diamond Drill Carbon Co

Buggies, Mine Car (Steel)
Hendrick Manufacturing Co

Brazilian Ballas:
Diamond Drill Carbon Co.

Brazilian Rock Crystal:
Diamond Drill Carbon Co

Brazilian Tourmalines:
Diamond Drill Carbon Co

Brazilian Aquamarines:
Diamond Drill Carbon Co.

Bridges—Man Trolley and Rope Operated—Material Handling
Canadian Mead-Morrison Co., Limited

Bronze, Manganese, Perforated and Plain:
Hendrick Manufacturing Co

Buckets:
Canadian Ingersoll-Rand Co., Ltd
Canadian Mead-Morrison Co., Limited
The Electric Steel & Metals Co
R. T. Gilman & Co.
Hendrick Manufacturing Co
Canadian Link-Belt Co., Ltd
Marsh Engineering Works
Mussens, Ltd.
MacKinnon Steel Co., Ltd
Northern Canada Supply Co.
Fraser & Chalmers of Canada, Ltd
The Wabi Iron Works

Buckets, Elevator:
Canadian Link-Belt Co., Ltd
Hendrick Mfg. Co
Peacock Brothers Limited.

Cable—Aerial and Underground:
Canada Wire & Cable Co.
Northern Canada Supply Co
Standard Underground Cable Co. of Canada, Ltd

Cableways:
Canadian Mead-Morrison Co., Limited
Fraser & Chalmers of Canada, Ltd
Mussens, Ltd
The Wabi Iron Works
R. T. Gilman & Co

Cages:
Canadian Ingersoll-Rand Co., Ltd, Montreal, Que
Northern Canada Supply Co
Fraser & Chalmers of Canada, Ltd
The Electric Steel & Metals Co
The Mine & Smelter Supply Co
Mussens, Ltd
The Wabi Iron Works

BLUE SKY LEGISLATION. — ONTARIO VIEWS.

By R. E. HORE.

At a well attended meeting of the Toronto branch of the Canadian Mining Institute on Saturday Feb. 12, one of the chief topics of discussion was the sale of shares in mining companies. It was pointed out that Ontario has taken good care to protect the public from fraud and that the carrying out of the existing laws should leave little to be desired so far as companies incorporated in Ontario are concerned. Mr. J. P. MacGregor in introducing the discussion drew attention to the fact that such protection is lacking in the case of companies incorporated in other countries. Promoters of such companies can send salesmen into Ontario and sell stock without being required to conform to the law governing Ontario companies. It was suggested that legislation should be asked for to cover such sales of stock. The legislation of some of the United States was referred to in the discussion, and it was pointed out that in some States that sellers of shares must have permits and that these are only granted after the Government's questionnaire has been satisfactorily answered.

There was some difference of opinion as to whether the Blue Sky legislation has done any great good; but most of those who expressed their views in the discussion seemed of the opinion that such legislation is desirable. It is understood that the subject will be discussed at the Annual Meeting of the Institute in Montreal.

BRITISH EMPIRE STEEL CORPORATION, LTD.

It is officially announced that the directors of Dominion Steel Corporation, Ltd., Nova Scotia Steel and Coal, Ltd., and Halifax Shipyards, Ltd., have agreed upon a basis of consolidation and share exchange under the charter of British Empire Steel Corporation, Limited. Consolidated is subject to fulfillment of an agreement with underwriters for the provision of certain sums of new capital, after completion of which the several boards of directors concerned will again meet for the purpose of approving the underwriting. Following this, circulars disclosing the various agreements and the proposed basis of share exchange will be issued to the shareholders, and special meetings of the shareholders will be called for approval and ratification of the proposals and agreements.

The character of the financing and the basis of share exchange has not been made public, but it is understood closely to follow the proposals of last June, except that the arrangements are modified to suit the smaller number of constituent corporations to be included in the consolidation.

The corporations proposed to be merged, and their subsidiaries, have their producing operations entirely in the Maritime Provinces and Newfoundland, and decided economies in operation combined with increased efficiency in production, transportation and sales, are expected to follow unified management of a congerie of operations closely associated in character of production, and physically contiguous.

The Majestic Gold Mines, Limited, has been incorporated under the Ontario Companies Act, with one million dollars capital and head office, Toronto. The provisional directors are H. H. Davis, J. R. Rimball and J. S. Beatty, of Toronto.

EDITORIAL

POPULAR LECTURES ON MINING.

The recent discussion arising from the Ontario Government's proposal to increase the tax on mining profits should serve to draw attention to the necessity of telling the public more about the mining industry, and of the benefits that development of mineral resources bring to the community. Those engaged in mining very properly devote their attention to the problem of making their particular enterprise profitable to those taking part in it. It is not their concern that the development of a mine should profit the general public; but it is well known that it does. This being the case it may properly be argued that since development of mineral resources is a benefit to the community the industry should be encouraged. Those engaged in mining and those who profit directly from mining operations are well aware of the fact that mining companies are expending annually millions of dollars for labor and supplies. They know that the development of mining properties means new markets for supplies of all kinds for mining purposes and for the workmen and their families. Many manufacturers and merchants have good reason to know that mining activity means increased business for them. There are, however, a very large number of people who benefit indirectly from mining operations without knowing it. There is little endeavor made to enlighten these people and consequently they do not properly appreciate what benefit they derive from the operation of mines and they care little whether mining flourishes or not. They learn that some mining companies make very large profits by mining operations and they are inclined to favor any proposal which will give them direct and immediate benefit from these profits regardless of the future.

This being the case it may be well to consider whether those who are interested in mining should not take some action along the lines suggested in the February Bulletin of the Canadian Institute of Mining and Metallurgy. In an article in this bulletin, Mr. Geo. Mackenzie supports the proposal of President O. E. S. Whiteside that the laymen should be given opportunity of learning more about mining and metallurgical operations and that members of the Institute might well undertake to give popular illustrated lectures with a view to informing the public on the elements of mining enterprises. Mr. Mackenzie proposes that a series of lectures each telling of some phase of the industry should be prepared and a number of lantern slides made to illustrate the lectures. These might be used advantageously in many parts of the country. The proposal seems to be a good one and if carried out might result in dissipating some very faulty ideas.

THE MINING-PROFITS TAX IN ONTARIO.

There is now before the Ontario Legislature a proposal to increase the Provincial tax on the profits of mining companies. This naturally meets with opposition from the mining companies; but such opposition would doubtless be over ruled if only the mining companies were likely to suffer. The tax gatherers must get their money from the people who are reputed to be able to pay and having learned that some mining companies have made a lot of money during recent years they will endeavor to take as much of it as they can without wiping out the industries which make the money. The tax gatherer is not interested in the companies that are not making taxable profits and he has the support of large numbers of citizens who never give a thought to the fact that mining is a venturesome business and that it will not flourish unless there are possible large profits for the relatively small number of companies that succeed. Such people are envious of the successful operators and, being unaware of the risks taken and the difficulties overcome by the operators, they believe that they are entitled to share in the profits made even though they did not themselves risk any money in the ventures. They regard nickel, gold and silver deposits as the property of the Crown and consider that if there is any profit made in mining the ore the people of the Province should benefit from it. Though they do not propose to reimburse unsuccessful operators. The problem before the operators is to make it apparent that the general public receives large benefits from the development of mineral resources. These benefits are well known to

many people. The workmen employed know of them, the merchants and manufacturers in many towns and cities know of them. Everyone engaged in the mining industry and everyone resident in or in the neighborhood of mining communities knows that the development of an idle property into a producing mine is a thing to be desired, for it directly or indirectly benefits a large number of people who take no financial risk in the venture. Such benefits are the big contribution by mining companies to the welfare of the community and it is hardly good statemanship to discourage such ventures by penalizing severely those who succeed.

Throughout the world metals are sold at prices which make possible large profits for only a few fortunate companies. Even in such cases it is true that the money paid to workmen and others in the community far exceeds the money received by shareholders. Such companies could pay higher taxes; but is it wise to impose high high taxes when it is known that development of new properties depends so largely on the successful ones being allowed to keep the profits they have made by their enterprise?

Everyone who knows anything about the mining industry knows that those who develop mineral properties take long chances. Some can tell better than others whether a deposit is likely to prove valuable or not; but in the early stages of all mines there are times when it is very doubtful whether further expenditures will prove profitable or not. Such expenditures are then undertaken only because there seems a reasonable chance of making large profits. If the tax gatherers prevent the possibility of such profits the development of properties will naturally cease.

Those who realize that the development of mineral resources is a great benefit to the community will be displeased with the expressed intentions of the Ontario Government. They will have good cause to consider whether they should not take more active part in education of the general public with a view to enlisting support for their claim that mining should be encouraged because it is in the general interest. A number of those who would be affected by the proposed increased tax are actively taking part in opposing it and it is possible that the bill will be withdrawn. But the mere fact that the Government has seriously considered increasing the tax on profits should be sufficient to make it apparent that a large section of the public does not understand the rudiments of the mining industry. It is quite unlikely that the people of Ontario would approve of action that would kill the goose. It remains for those interested in mining to tell the rest of our citizens something about the development of mines and the accompanying benefits to the community so that the public will commence to view with disfavor these repeated attempts to injure mining enterprises.—R. E. H.

THE LEROY MEMORIAL FELLOWSHIP AT McGILL.

The "Canadian Mining Journal" is glad to be permitted to publish in this issue an account of the establishment of the LeRoy Memorial Fellowship for post-graduate studies in geology at McGill University, made possible through the collection of over eleven thousand dollars from 119 subscribers, whose names are also given.

A memorial of this character, to a scholar-soldier who died leading his men in battle, perpetuates not only the name of him in whose memory it is founded but the best traditions of the wedded races that compose the Canadian commonwealth. It is not so much singular, as significant, that McGill University should have had as its spokesman in acknowledging the endowment fund the soldier chosen to lead Canada's divisions in the epic conflict so recently and so victoriously concluded.

WIDER PUBLICITY FOR INSTITUTE PAPERS.

In the February Bulletin of the Canadian Institute of Mining and Metallurgy, Mr. Geo. Mackenzie makes a number of interesting suggestions as to ways in which the Institute might increase its usefulness to the mining industry. His remarks about publication of papers show a readiness to depart somewhat from the former policy of the Institute. Like many other societies the Institute has been inclined to hide its professional papers from the public eye until they become so aged that they have lost public interest. If the new Secretary finds support for his suggestion we may expect to see some account of the papers in the technical press and in newspapers in mining communities before the authors have forgotten that they sent them to somebody for publication.

It is, however, not only in promptness of publication that the present practice would be improved. A much larger and varied number of readers would be reached. And it is well to bear in mind that it is the Institute's propers business to give publicity to such papers. In publishing the papers in the official bulletin of the Institute and in the Annual Transactions the Institute is serving its members but not to any large extent serving the public. It is worth considering whether endeavoring to get into closer contact with the public. There was a time when professional papers were zealously guarded by societies as being prizes for the members only. It was sometimes stated as an inducement to a prospective member that the papers presented were so valuable that they were kept for the use of members until they became so old that they were useless. The privilege of being able to obtain copies of these papers was considered to be worth a great deal to members and prospective members were led to believe that they could make no great advance in their profession until they joined the society and learned its secrets. Now, the Canadian Mining Institute has not

been as great an offender as some societies, but there have been times when something of the old line technical society has been more in evidence than has the real object of the founders of the Institute.

If Mr. Mackenzie's proposal meets with the approval of members there will be doubtless more and better papers prepared and they will be more widely read. Wider distribution of anything that is good for the industry is an object worth striving for. In the past there has been some willingness to permit publication of the papers, but no great effort made to obtain publication. It is possible that some of the papers would not be found acceptable by the technical journals, but most of them have parts of general interest and some are of a character to interest a very large number of people who never see the official publications of the Institute.—R. E. H.

THE COST OF MINING.

Purchase and perusal of Prof. J. Ralph Finlay's revised work on "The Cost of Mining" can be confidently recommended. The book deals in a satisfying manner with virtually every branch of mining. The concluding chapter contains illuminating comment on silver-mining costs at the Cobalt mines, where the practice — in the earlier stages of the camp — is quoted as an example "of the absolute inconsequence of high costs per ton in precious-metal mining." Figures as late as those of 1918, relating to the Kerr Lake Mines, are compared with those of ten years earlier.

Prof. Finlay's remarks on "partial and complete" costs show much experience and insight. He says: "I know from experience that many operating men, though deep in details, are acquainted only with partial costs. Their point of view does not reach the *tout ensemble.*" Much of the partial and inchoate conception of costs of otherwise competent mining men is due to mistakenly conceived notions of secrecy still clung to by mine executives. Secrecy of this kind is always followed by a sure Nemesis, and the practice of some mining companies of keeping operating costs and what has been previously referred to in these columns as "ultimate costs", in watertight compartments; always ends in befuddlement of all concerned, leading to grevious errors and lack of team work in mine organizations.

The argument is summed up in Dr. Finlay's axiom: "The price of a commodity must be governed by its cost." This is precisely the information that many mining boards are not in possession of as regards their product. Dr. Finlay states he has never come across a mining enterprise where the real value of selling cost was calculated. The statement is not one that we are able to contradict. Selling cost is only correctly calculated when the calculation includes "all capital employed, with interest for the whole period of operating." How few mine accountants have ever attempted such a calculation, and yet how valuable is the, corrected conception of the financial standing of a mining enterprise that such a calculation discloses?

The recently-issued annual report of the Hollinger Mine showed that all development charges had been written off. No other procedure is of course correct, but nevertheless it is so unusual a procedure as to excite comment, a circumstance that in itself reveals a widespread misconception of what development is. In most cases it is nothing more than an operating charge. It is often miscalled "capital expenditure", or "maintenance" and placed to suspense accounts under various disguises, but it is a purely operating charge and must be added to current mining costs before payment of dividends from profits can be properly made.

A further quotation will illustrate how correctly Dr. Finlay states a fundamental principle of sound mine-accounting, and suggests that his really monumental work is a necessary addition to any mining engineer's library that does not already contain it. To quote:

"A sound business must be a paying business; one
" that is good for both interest and principal. The
" great fault with the mining business from the point
" of view of the moderate investor is that it is very
" easy for the sake of a fair amount of interest to lose
" the principal. There is no need of this. By studying out the vital question of the life of a mine with
" its concurrent rate of amortization, and by steadily
" refusing to believe that current construction is 'capital', one may eliminate overvalued properties very
" rapidly. *It is a good rule not to buy stocks in*
" *concerns that are too wise to issue full reports.* (The
" italics are ours). If there is any business in the
" world where a full knowledge of certain elemental
" facts is necessary for a safe and sane investment it
" is surely mining."

ASSOCIATED GOLDFIELDS MINING CO. LTD.

We are informed by Dr. Mackay, President of Associated Goldfields that development is proceeding very satisfactorily under the management of Mr. Geo. A. Gray, formerly chief Engineer at The Dome Mines.

The new shaft is now down about 175 feet, and the first station and ore pockets are being prepared. The sinking of the shaft will be carried on simultaneously with the cross cutting of the large ore body. Word from the mine shows that high grade ore is being encountered at present.

The work on the new Wendigo Power is progressing well. Over 500 feet of rock cut has been completed.

They have about 110 men on the payroll.

The application for an injunction by Fasken & Company, on behalf of P. Kirkegaarde restraining Goldfields Limited, from executing sale of their assets to Canadian Associated Goldfields, Limited, as passed at the special meeting of the shareholders, was dismissed with costs today.

The hearing was very brief and the bench commenting pointed out that no evidence was presented to substantiate the application. Mr. McMaster of Messrs. McMaster Montgomery & Bullen represented Goldfields Limited.

The LeRoy Memorial Fellowship at McGill University

Osmond Edgar LeRoy was born in 1873 at St. Andrews, Argenteuil County, Quebec, where his parents, Mr. and Mrs. Alexander LeRoy, still reside. From the Lachute High School he entered McGill University in 1891 and graduated from the Faculty of Arts with first-class honours in Natural Science in 1895. The year following his graduation was spent in post-graduate study at McGill and the succeeding two years as Headmaster of the Model School at Montreal West. From 1898 to 1902 he was Demonstrator in Geology at McGill; while occupying this position he spent one summer studying at Harvard University and the others in geological field work. He assisted Dr. Frank Adams in the preparation of a report on "The Artesian Wells and Deep Borings on the Island of Montreal", which was published by the Geological Survey of Canada in 1904. In 1901 he presented a paper on Rigaud Mountain, Quebec, before the Geological Society of America at Albany. In 1903 he received the degree of M.Sc. from McGill.

During the summers of 1901, 1902, and 1903, LeRoy assisted Dr. A. E. Barlow in his geological studies of the Sudbury and Temiskaming areas and, in 1902, was appointed to the staff of the Geological Survey of Canada.

In the autumn of 1903, he became Consulting Geologist to the Imperial Chinese Mines-Prospecting Administration, which position he ably filled for the succeeding three years. His keen interest in the geological problems of China was only equalled by the warmth of friendship of his Chinese associates.

Returning to Canada in 1906, he spent a few months on the Geological Survey, when he again resigned to engage in professional work for private interests in the Cobalt area where rich deposits of siver had then been recently discovered. During the winter of 1907-1908, he was acting Head of the Department of Geology at Queen's University. In 1908 he was reappointed to the Geological Survey and in the succeeding four years prepared numerous valuable reports and papers on the geology of several of the important mining areas in British Columbia. In 1912, he became the Geologist in charge of Field Parties; his enthusiasm for the work in hand, his organizing and executive ability, and his kindly personal interest in those associated with him, are reflected in the superior character of the work produced by the Geological Survey while he filled this position.

In January, 1916, he received a commission as Lieutenant in the 72nd Seaforth Highlanders of Vancouver. Upon the organization of the 196th. (Western Universities) Battalion, he transferred to this unit with the rank of Captain, and was placed in command of the British Columbia University Company. He accompanied the Battalion overseas; and when the 19th. Reserve (Saskatchewan) Battalion was formed, the command of F. Company was given to him. On May 25th. 1917, he reverted to the rank of Lieutenant in order that he might proceed to France where he joined the 46th. Battalion. In June 1917, because of his brilliant work during the attack on Lens he was promoted on the field to the rank of Captain. On the 26th. October 1917, while leading his men in the assault of Passchendaele, he received the wounds which caused his death on October 28th. The following is an extract from a letter of the Colonel of the Battalion to Captain LeRoy's mother.—"His service with the 46th. Battalion was a very gallant one; he had proved himself a true leader of men and we all had the greatest confidence in him as an officer and the greatest liking for him as a man and a comrade. His death is an irreparable loss to the Battalion and is deeply, very deeply, regretted by all and I wish to express to you my own sincere regret and sympathy."

In LeRoy's death, Canada lost not only a valiant soldier but primarily an unusually capable economic geologist. He possessed such a wholeheartedly genial personality that he was beloved by all those who were fortunate enough to know him. Few men have enjoyed the confidence of a wider circle of friends and acquaintances. In order that a fitting and permanent memorial to him might be established, some of his friends decided that a LeRoy Memorial Fellowship in Geology should be founded at his Alma Mater. A subscription list was opened in March 1920 with the result that $11,450 has now been paid over to the Governors of McGill University. This fund has been invested in such a manner as to permit the annual award of a LeRoy Memorial Fellowship of $700 to some worthy student desirous of pursuing post-graduate studies in Geology at McGill.

On receiving the LeRoy Memorial Fellowship for McGill University, Sir Arthur Currie wrote as follows:—

"McGill University desires to assure the donors that she accepts this gift with feelings of deep gratitude and pride, and will obey the conditions laid down. She regards the late Mr. O. E. LeRoy as one of her most outstanding graduates and recognizes that by his life and the manner of his death, additional lustre has been added to the name of his Alma Mater. She believes that no more worthy manner of perpetuating his memory can be found. As long as the name of McGill endures, the memory of LeRoy will be cherished, and the Fellowship will enable more and better services to be rendered by the Department of Geology, a subject which he had so much at heart and to the study of which he gave so much of his life."

"I would like to add that I am proud to have known LeRoy, Captain LeRoy he was to me. I knew him as one of the outstanding officers of the Canadian corps, and can most cordially subscribe to what his commanding Officer has said of him."

The list of contributors to the LeRoy Memorial Fellowship fund embraces 119 names, about three-fourths of whom are members of the Canadian Institute of Mining and Metallurgy:—

W. S. Johnson, Lachine, P.Q., $1,000.00; Frank W. MacLennan, Miami, Arizona, $543.75; Dr. Milton Hersey, Montreal, P.Q., $500.00; Mr. & Mrs. Alex. Le Roy, St. Andrews, P.Q., $500.00; J. W. McLeod, Thorburn, Nova Scotia, $500.00; Dr. E. P. Mathewson, 42 Broadway, N.Y., $500.00; H. P. DePencier, The Dome Mine, South Porcupine, $300.00; Col. R. W. Leonard, St. Catharine, Ont., $300.00; D. H. McDougall, New Glasgow, N.S., $300.00; C. V. Corless, Copper Cliff, Ont., $250.00; W. A. Carlyle, Ottawa, Ont., $250.00; Dr. J. D. Ross, Ottawa, Ont., $250.00; Colin L. Camp-

bell, Montreol, P.Q., $200.00; Weedon Mining Company, Montreal, P.Q., $200.00; W. Munro Archibald, Rossland, B.C. $150.00; E. E. Campbell Anyox, B.C., $150.00; Norman McL. Campbell, Montreal, P.Q., $150.00; W. Fleet Robertson, Victoria, B.C., $150.00; R. M. Wilson, Montreal, P.Q., $150.00; Frederick Cowans, Salt Lake City, Utah, $108.25; Royal Victoria Lodge, A. F. & A. M. No. 57 Q.R. Montreal, $105.00; Dr. F. D. Adams, Montreal, $100.00; Dr. J. A. Bancroft, Montreal, P.Q., $100.00; S. G. Blaylock, Trail, B.C., $100.00; C. M. Campbell, Phoenix, B.C., $100.00; C. L. Cantley, New Glasgow, N.S., $100.00; Col. Thos. Cantley, New Glasgow, N.S. $100.00; Sir John Carson, Montreal, P.Q., $100.00; A. R. Chambers, New Glasgow, N.S., $100.00; E. J. Conway, Anyox, B. C., $100.00; Angus W. Davis, Vancouver, B.C., $100.00; J. A Dresser, Contreal, P.Q., $100.00; T. C. Denis, Quebec, P.Q., $100.00; R. P. Doucet, Montreal, P.Q., $100.00; Chas. Fergie, Montreal, P.Q., $100.00; C. P. Hill, Vancouver, B.C., $100.00; J. Keele, Ottawa, Ont., $100.00; H. L. Kerr, Toronto, Ont., $100.00; S. F. Kirkpatrick, Ottawa, Ont., $100.00; E. C. Montgomery, Kimberly, B.C., $100.00; W. McInnis, Ottawa, Ont., $100.00; E. Orkin, Montreal, Que., $100.00; Dr. J. Bonsal Porter, Montreal, Que., $100.00; A. E. Robitaille, Fifth Ave., 44th St., New York City, $100.00; Capt. J. G. Ross, Montreal, $100.00; R. H. Stewart, Vancouver, B.C., $100.00; W. E. Segsworth, Toronto, Ont., $100.00; R. O. Sweezy, Montreal, Que., $100.00; O. E. S. Whiteside, Coleman, B.C., $100.00; Dr. J. A. Allan, Edmonton, Alta., $75.00; W. C. Mitchell, Montreal, Que., $75.00; Dr. L. C. Graton, Cambridge, Mass., $54.37; Professor J W Bell, Montreal, $50.00; M. F. Connor, Ottawa, Ont., $50.00; Geo. E. Cole, Haileybury, Ont., $50.00. W. H DeBlois, Tweed, Ont., $50.00; J. G. Dickenson, Cobalt, Ont., $50.00. Norman Fisher, Thetford Mines, P.Q., $50.00; E Hibbert, Sudbury, Ont., $50.00; W. V. Howard, Trinidad, B.W.I., $50.00; T. A. McLean, Montreal, $50.00; Dr. J J O'Neill, Gulmarg, Kashmir, India, $50.00. Dr Bruce Rose, Calgary, Alta., $50.00. Bruce Ritchie, Trail, B.C., $50.00; Hon. Geo. R. Smith, Thetford Mines, P.Q., $50.00; H. F. Strong, Haileybury, Ont., $50.00; I. G. Wheaton, Gowganda Ont., $50.00; N. M Ymll, Montreal, Que., $50.00; J. D Galloway, Hazelton, B.C., $30.00; Walter Adams, Montreal, $25.00. Dr F. J. Alcock, Ottawa, Ont., $25.00. G. L. Burland, Thetford Mines, P.Q., $25.00; W H. Burgess, Kaslo, B.C., $25.00; Chas Camsell, Ottawa, Ont., $25.00. Dr. W H Collins, Ottawa, Ont., $25.00. Alan E. Cameron, Edmonton, Alta., $25.00; Dr. W E Cockfield, Ottawa, Ont $25.00. Dr. H. C Cooke, Ottawa, Ont., $25.00. Alexander Dick, Montreal, Que., $25.00; A. O Dufresne, Quebec, P Q., $25.00; Dr. R A. Daly, Cambridge, Mass., $27.19. Geo. D. Drummond, Montreal, Que., $25.00; Professor R P. D. Graham, Montreal, Que., $25.00. Nancy Haultain, Ottawa, Ont., $25.00. F. W. Gray, Ste Anne de Bellevue, P.Q., $25.00. R A Johnson, Ottawa, Ont., $25.00. J C Kemp, Montreal Que., $25.00. Ernest K Koch, Montreal, Que., $25.00 W S Lecky, Ottawa, Ont., $25.00. Stewart J Lloyd, University of Alabama, U.S.A., $25.00; John McLeish, Ottawa, Ont., $25.00. Geo R McLeod, Montreal, Que $25.00. Professor J G. McKay, Kingston, Ont., $25.00 J McEvoy, Toronto, Ont $25.00. Professor D A Murray, Montreal, P.Q., $25.00. Geo Riley, Montreal Que., $25.00. H M Rosece, Anyox, B.C., $25.00. P W Racey, Vancouver, B.C. $25.00 Dr F H Sexton Halifax, N.S., $25.00. Alexander Gray, Montreal Que., $20.00; C S. Finnie, Ottawa, Ont., $15.00. Q J Maltby Montreal, Que., $15.00; J. MacIntosh Bell, Almonte, Ont., $10.00; H. H. Claudet, Ottawa, Ont., $10.00; S. J. Crocker, Vancouver, B.C., $10.00; J. F. B. Davies, Drummondville, P.Q., $10.00; G. S. Eldridge, Vancouver, B.C., $10.00; E Faribault, Ottawa, Ont., $10.00; H. Frechette, Ottawa, Ont., $10.00; Chas. H. Fox, Montreal, Que., $10.00; J. M. Forbes, St. John, Nfld., $10.00; Professor H. M. McKay, Montreal, Que., $10.00; E. R. Paterson, Montreal, Que., J. R. Pearson, Danville, Que., Professor N. N. Evans, Montreal, Que., $5.00; A. T. MacKinnon, Ottawa, Ont., $5.00; H. G. Roulean, Ottawa, Ont., $5.00; J. M. Turnbull, Vancouver, B. C., $5.00. Bank interest, $91.44. Total, $11,450.00.

ANNUAL SCIENCE DINNER AT QUEEN'S

The 20th Annual Dinner of the Engineering Society of Queen's University, Kingston, was held on the 17th February, and was notable because of the attendance of many graduates of the University who are now prominent in official positions in corporate and government service.

Major-General Macdonell, Commandant of the Royal Military College, after the toast to the King given by the President of the Society, proposed the toast to Canada, and spoke of the problems of assimilating the immigrants to Canadian ways of life. He urged that those present should assist to "Keep Canada Canada to the end".

Mr. Charles Camsell, Deputy Minister of Mines, spoke of the necessity of trained young men for prospecting and geological work in Canada. "We are proud of our past", said Mr. Camsell, "but we shall be prouder still of our future".

Mr. R. L. Peek, Managing Superintendent of the refinery of the British-American Nickel Company at Deschênes, did not favour specialization until after years of practice. Queen's men had benefited by the poverty of the University, which had taught them adaptability.

Mr. G. C. Bateman, Manager of the La Rose mine, Cobalt, referred to the present ferment in society, and suggested that a series of lectures should be arranged to be delivered at Queen's by Queen's graduates who have risen to positions of eminence in engineering.

Mr. Fraser D. Reid, Manager of the Comagas mine, urged greater attention to standardization in engineering.

Dr. T Kennard Thomson, with the aid of lantern slides, explained project for fuller utilization of the water powers of the St. Lawrence and Niagara Rivers, and urged the formulation of an international treaty that would permit of greater utilization of the possibilities of the Niagara River below the Falls. Dr. Thomson gave full credit to the accomplishment of the British Navy during the war, and showing the entwined Stars and Stripes and the Union Jack on the screen, said: "That is a League of Nations by itself which would ensure justice for the entire world."

Principal Taylor, Prof. W. L. Walcar and Dean Clark spoke to various appropriate toasts.

The Dinner was voted to be a complete success and as will be seen from the foregoing brief summarisation, taken from "Queen's University Journal" was in many important respects a notable occasion.

Oil Regulations in the North West

A Precis of the Order-in-Council of 11th February 1921.

The Canada Gazette of February 19th contains the new Regulations for the "Issue of Oil and Gas Permits and Leases in the Northwest Territories of Canada", approved by the Governor General in Council under date of 11th February, and superseding the former regulations, suspended by Order-in-Council dated 22nd January, and now rescinded.

The Regulations cover five pages of the "Gazette". A precis follows:

No Par-Value Shares Required.

Companies entitled to lease oil and gas locations must issue shares without nominal or par value. (This regulation has since been amended to protect companies having issued shares of stated par-value that acquired rights to oil and gas locations in the Northwest under prior regulations.)

Permits to Search.

Maximum area of oil and gas rights which may be acquired by an applicant under permit shall be 2,560 acres, or four square miles, and no person shall be permitted to acquire a greater area except by assignment. Such maximum area may be selected in not more than five separate blocks covered by five permits, but no person is permitted to hold under permit at the same time more than five locations acquired by application.

After expiration of twelve months from the date of permit, a person who subsequently abandons or assigns the same, may again apply for a permit, provided all liabilities to the Crown are paid up.

In case of dispute, permit will be issued to person who proves that he first staked the location, and made application to the mining recorders within the specified time.

The location shall be rectangular in form, except where a boundary of a previously located tract is adopted as common to both locations, the length not to exceed the breadth four times.

Specific instructions as to correct staking, and definite information is furnished as to the exact position of the location the application for a permit will not be considered.

Where the tract applied for is located on the margin of a lake or river, its least dimension shall be in the general direction of the water frontage.

Application for permit must be made within thirty days after staking, if situated within one hundred miles of the recorder's office, and one extra day is allowed for every additional ten miles.

A payment of fifty cents per acre, being the rental for the first year of location, must accompany every application.

Permittees shall within two years from the date of the permit assemble upon the location a substantial and adequate drilling outfit satisfactory to the Minister, to commence actual drilling operations, and must give full particulars of cost, date and exact location to the Minister. In default the permit lapses automatically, and may be re-opened for location after notices have been posted for thirty days.

Rental for second year of term shall be at the rate of one dollar per acre, payable in advance, but if drilling equipment has been installed within the first year, the second year's rental will not be required.

Rental for third year shall be at the rate of one dollar per acre but if drilling operations have been commenced prior to the commencement of the third year, the rental will not be required.

At the termination of the third year of the term of the permit unless the permittee can show that he has drilled one or more wells to a depth of at least 500 feet each on each location, or has expended in actual drilling operations thereon the sum of not less than $5,000, exclusive of the cost of machinery and casing, the permit shall be automatically lapsed and forfeited.

If oil in commercial quantity has not been discovered on the location the permittee shall, during the fourth year, continue his operations, and shall drill one or more wells to a depth of not less than 2,000 feet, or to such depth as the Minister may consider sufficient to determine whether or not oil in commercial quantity exists on the location.

If on the termination of the fourth year, oil in commercial quantity has not been discovered, the permit shall lapse.

If at any time during the period of the permit, oil in commercial quantity is discovered, the permit shall terminate and the permittee shall become entitled to a lease of a portion of the location not to exceed one-fourth of the area, upon due staking and filing as prescribed. The remainder of the location is reserved to the Crown.

Leases.

Term of leases shall be for 21 years, renewable for a like term, upon compliance with the regulations. Rental shall be one dollar per acre per annum. A fee of five dollars must accompany each application for either permit or lease, which will be refunded if the rights are not available, but not otherwise.

Until 1st April 1926 a royalty of five per cent. of the value of the oil production shall be collected by the Crown, after which date a royalty of ten per cent. shall be collected. Sworn monthly production returns must be made to the Minister, on pain of forfeiture for default.

A royalty on natural gas and products may be levied by Order-in-Council.

Lease shall only include the oil and gas rights, but sufficient surface rights for operations may be acquired at a rental of one dollar per acre per year, additional to lease rental.

The boundaries beneath the surface of a location shall be the vertical planes in which the surface boundaries lie.

No well shall be bored or drilled within 200 ft. of location boundaries, except by permission under prescribed regulations.

Before commencing operations on an acquired location, operator must inform the Minister of point of operation, number or designation of well, size and weight of casing, kind of drilling-rig, name and address of person in charge.

Operator shall at all times take reasonable measures to prevent injurious access of water to the oil-bearing formation, and, upon abandonment of well, precautions to prevent access of water must be taken. If water is encountered, well must be closed so as to shut water off from oil-bearing formation.

In case of discovery of gas, reasonable precautions must be taken to prevent waste and escape of gas. In default of taking of prescribed precautions the Minister may take action to prevent waste, all expenses being chargeable to the lessee, and for this purpose the employees and equipment of the lessee may be commandeered.

Additional regulations may be promulgated at the discretion of the Minister.

In case of abandonment of well, due notification of such intention shall be given before removal of equipment, and written information shall be given to the Minister of date of proposed abandonment, quantity and size of casing in well, and of casing proposed to be removed, depth at which water was encountered, and method taken to shut off same; depth at which gas was encountered, and whether any escape of gas will result from abandonment.

Assignment, transference or sub-letting is not permitted except by consent of the Minister.

If considered advisable the Government may at any time enter into possession of a location, together with equipment thereon, or any portion thereof, upon payment of compensation not to exceed the profit the operator would have earned. In case of dispute, compensation is fixable by a Judge of the Exchequer Court.

On locations that yield oil in paying quantity lessee shall use due diligence to maintain production.

Annual returns of days of operation, number of men employed, character of operations, depth attained, total expenditure incurred, quantity and nature of production, etc., shall be filed, under penalties and pain of cancellation in default.

Where application for permits and leases has been filed prior to issue of new regulations where leases have not been granted application is to be dealt with under the new regulations not to exceed five locations. If less than five locations applied for prior to issue of new regulations, applicant may ask for five in all. (Since amended).

Where the Minister is satisfied than an applicant is committing or attempting fraud, misrepresentation, or has unfair dealings with the public in connection with his applications, refusal or cancellation of permits or leases is at the discretion of the Minister.

Subsequent Amendments.

Since the regulations — of which the foregoing is a condensation — were gazetted, an Order-in-Council has been issued, which amends them in several particulars, the amendment with regard to stated value of issued shares as having already been noted.

Section 51, referring to applications made before issue of new regulations is amended to provide that applications so made, but not granted, shall be dealt with under the regulations in force at the time of the application.

The Order in Council also states that citizens of another country, the laws, customs and regulations of which deny similar or like privileges to citizens or incorporations of the British Empire shall not, by stock ownership, stock-holding, or stock control, own any interest in any permit or lease acquired under the provisions of the regulations.

The Chairman of the South Metropolitan Gas Company, Dr. Charles Carpenter, a Member of the Institution of Civil Engineers, recently stated at the Annual Meeting of Shareholders that the coal supply of Britain had never been of worse quality during the time its production and distribution had been under Government control. "One more example of the invariable result that the more completely an industry is in Government hands the less efficient does it become". The experience seems a universal one.

BOOK REVIEW.

THE UNIVERSITY IN OVERALLS—A Plea for Part-Time Study, by Alfred Fitzpatrick, Principal of the Frontier College, Toronto. With introduction by Dr. W. L. Goodwin, Queen's University, Kingston.

Among the educators of Canada that have emphasised the social and moral value of education, while insisting also upon technical education as a necessity, Dr. W. L. Goodwin has always been distinguished, and in university extension work Queen's University has been a pioneer. It is therefore fitting that Dr. Goodwin, as one who is at this time personally engaged in teaching prospectors' classes in the scattered mining camps of Ontario, and has represented the views of the Canadian Institute of Mining and Metallurgy in recent important conferences on education that have been held in Canada, should write the introduction to a book that pleads for still wider-flung extension of university effort.

From personal observation of the work of the instructors of the Reading Camp Association (now the appropriately-named Frontier College) the Editor can pay tribute to its value. During troublous years, when employers of labor looked with just suspicion on things that savored of propaganda and that might conceal hidden and malign motives under fair pretenses, the college-trained youths who act as instructors of the Frontier College in their unique educational mission in the remote lumber, mining and construction camps of our frontiers of settlement, have steadily won the favour of employers and workmen. The daily life of the Frontier College instructor is no bed of ease. He must work all day with those who are his pupils in the long evenings; and in direct social contact with the workers and the self-supporting character of the instructors, the work of the Frontier College in the field of education is not unlike the work of the Salvation Army in relation to more conventional forms of religious effort.

Mr. Fitzpatrick's new book, "The University in Overalls" suggests that the clearing of bush lands, the removal of liability to forest fires and summer frosts by extensive clearing and cultivation of such territories as the "Clay Belt" of Northern Ontario, should be made a department of organized national effort, and should not be slowly effected by the solitary toil and hardships of individual settlers, or by men gathered into camps as in wartime and separated from the society of women and family life. He suggests the creation of "clearing communities" where workers could live in small townships. This suggestion is not made to provide an outlet for immigration but to relieve the pressure on the cities. "Clearing and cultivating the land is the only profession in Canada that is not crowded", writes Mr. Fitzpatrick.

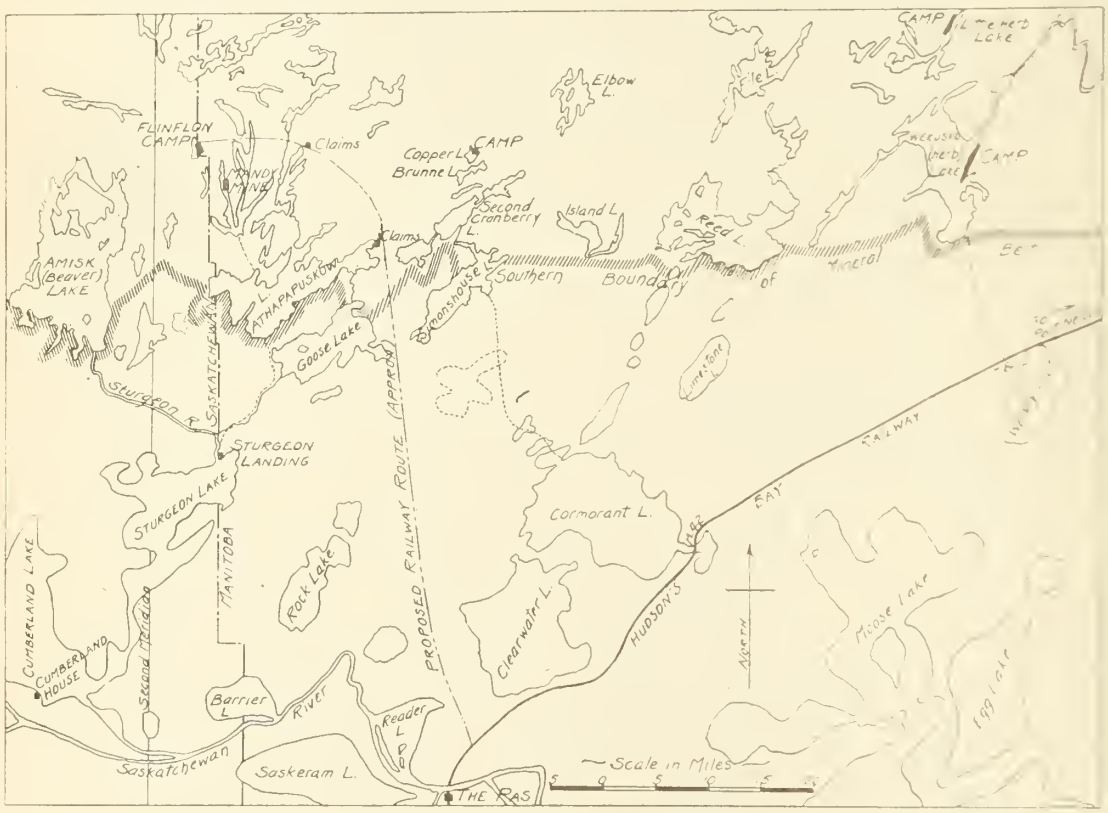
It is in Mr. Fitzpatrick's suggestions for enlargement of the work of the Frontier College that his book is most helpful, and, so far as the mining industry is concerned, mine companies and superintendents will make no mistake, and will reap much benefit if they will co-operate with Mr. Fitzpatrick and his workers — good, clean boys, headed by a man of real vision who is doing very much for the Canadianization of our foreign-born citizens and thereby stopping at its origin many possible future political and social trouble in this country.

The Flin Flon Ore-Body

By R. C. WALLACE, Commissioner of Northern Manitoba.

The Flinflon orebody is situated at the southeast end of Flinflon lake, which drains through a series of lakes into the Saskatchewan river. The orebody lies in township 67, ranges 29 and 30, west, approximate latitude 54 deg. 45' and approximately longitude 101 deg. 55' — four miles east of the second meridian, west. It lies practically on the boundary of the provinces of Manitoba and Saskatchewan, and is, in point of fact, cut at two places by the boundary line, lying, as it does, in the right angle between the north and south boundary line and the east and west correction line.

Flinflon lake is distant by air line 68 miles N.N.W. from The Pas, through which town the Canadian National Railway passes en route for Hudson's Bay.



The Pas is the distributing centre on the Saskatchewan river for the mineral field and for settlements on the Hudson's Bay Railway.

The summer route from The Pas is by way of the Saskatchewan river to Sturgeon Landing, which is the head of navigation for steamboat traffic, and thence by canoe to Flinflon lake. The total distance is 130 miles by steamboat and 60 miles by canoe, a total of 190 miles from railway communication. The canoe route can be shortened by using the summer road built by the provincial government from Sturgeon Landing to lake Athapapuskow. With light loads, however, the longer route is usually taken. The winter sleigh-road from The Pas is approximately 90 miles long. The property is near the well-established and historical canoe route from Cumberland House northwards through lake Athapapuskow and the Pine Root river to the Churchill river at Pukatawagan. The camp lies nine miles west of this route in a territory which was hitherto not frequently traversed between the Pine Root River valley and the Beaver Lake country.

Geological Features.

The orebody lies in amygdaloidal greenstones which are to be referred to the earliest volcanic flows in this district. They have been named by E. L. Bruce (who has mapped this area in detail for the Geological Survey), the Amisk volcanics, owing to their prevalence in the vicinity of Amisk (Beaver) lake. Associated with the greenstones, and probably somewhat later in age, although earlier than the granite intrusions, are quartz porphyries which are parallel in strike to the greenstones (326°) and which do not here display clear-cut intrusive relationships into the greenstones. There are also lamprophyric dykes which are apparently earlier than the intrusions of granite, probably earlier than the quartz porphyry flows, though later than the amygdaloidal greenstones. The later granite, which is found one mile southwest of the Flinflon orebody, and to which may be referred the granite porphyry intrusion immediately north of the orebody, has been named by Bruce the Kamims granite. This granite is intrusive, not only into the volcanics referred to above, but also into sediments that overlie

* A paper presented at the Western General Meeting of the Canadian Institute of Mining & Metallurgy, Winnipeg, October 1920, and reproduced from the Bulletin of the Institute for February 1920. (Cuts kindly lent by the Institute.)

the volcanics, but which are not exposed in the immediate vicinity of the Flinflon property. The Flinflon and other sulphide deposits of this district, as well as the gold deposits in the quartz veins, are to be referred to this granite as ore deposits representing deposition at lower and higher temperatures respectively.

During the process of shearing, which probably occurred in the earliest stages of the eruption of the Kaminis granite, the quartz porphyry offered greater resistance to the shearing forces than did the amygdaloidal greenstone. In the greenstone itself there are apparently units of greater resistance than others. In all probability the zones that suffered intensive shearing represent a volcanic tuff interbanded with the more massive lava flows. In the process of replacement by sulphides the more sheared zones have suffered much greater change than have the more massive members.

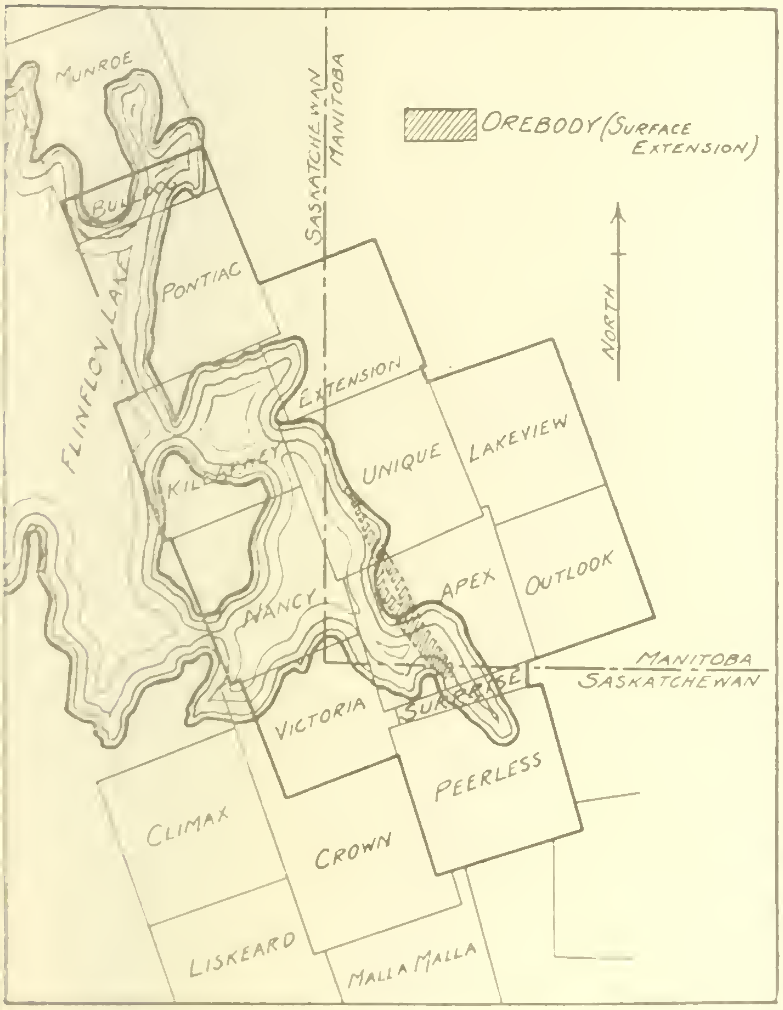


Fig. [illegible]—Group of claims comprising the Flinflon property

The Orebody.

Shape and Extent. — The orebody, which skirts the southeast shore of the lake, strikes with the country rock (324°) and dips approximately 70 deg. east. From the records of diamond-drill holes at the south end of the deposit, it would also appear that the orebody pitches at a low angle to the south. 'Horses' of unmineralized greenstone separate the orebody into more or less independent lenses. At the south end of the orebody a massive greenstone has been less affected by weatherings than the sulphides, and stands out as a prominent topographical feature on the property. It would seem, from the, as yet, incomplete drilling at the south end of the deposit, that this 'horse' forms part of a crescent-shaped mass of greenstone open towards the south. The deposit has a known length of 2,593 feet and has been proved to a depth of 900 feet over a length of 1,000 feet. Its greatest width transverse to the dip is 400 feet. This figure includes some narrow 'horses' of greenstone. Its greatest transverse width at the 900-foot level is 35 feet. From the results of diamond drilling and underground development work, the total tonnage has been calculated to be sixteen million, exclusive of the 'horses' of greenstone in the orebody. This estimate makes no allowance for possible ore under the 900-foot level or possible ore at depth on the line of pitch at the south end of the orebody. On the whole the orebody is more compact at the north end and shows a tendency to intermingle with inclusions of considerable widths of country rock towards the south end at depth.

Mineralogical Composition. — The minerals of the orebody are, in order of importance:

Pyrite,
Sphalerite, and
Chalcopyrite.

Gold and silver are apparently associated mostly with pyrite, the silver in all probability in the form of a mixed silver sulphide. Galena has been found in vugs in the otherwise unmineralized rock but does not occur in quantity in the orebody. Native copper is found in leaf form as a secondary mineral in the upper sulphide zone.

For practical purposes the ore is divided into two types: first, solid sulphides; second, disseminated ore. The solid sulphides occur in the centre and towards the hanging wall of the orebody and are in places in direct contact with the hangingwall. As a rule, however, a selvage of disseminated ores separates the solid sulphides from the hangingwall, while on the footwall there is found invariably a considerable width of disseminated ore. The hangingwall disseminated ore is found to carry small percentages of copper and a greater proportion of gold and silver than the disseminated ore on the footwall; in other words the deposition of pyrite is more extensive on the hangingwall side of the orebody, and the deposition of chalcopyrite is more extensive on the footwall side. As far as has yet been ascertained the same holds true, though to a lesser degree, with the solid sulphide, which gives the higher ratio in copper on the footwall side. The solid sulphides are bounded by unmineralized rock and the contact between solid ore and rock is generally sharp, [illegible] as a rule the contact between disseminated ore and solid sulphide is very distinct though in underground workings a definite gradation may be noted in places. The highest copper content of the deposit is found in the disseminated footwall ore which ranges from 3 per cent to 5 per cent copper, the copper ratio for the whole orebody, exclusive of 'horses' being approximately 1.9 per cent. A thin selvage of sphalerite separates the solid sulphide from the disseminated ore on the hangingwall side. [illegible]

which averages approximately 3.8 per cent of the whole orebody, is more abundant on the hangingwall side than elsewhere. While it might be expected that the gold would increase and the copper and zinc would decrease in depth, no indication of any such variation has been noted to the depth at which diamond-drilling has explored the property.

Origin. — The orebody has been formed by replacement of the rock which had already undergone intense mineralogical alteration during the shearing process. Where rock still remains (as in the disseminated-ore areas), its mineralogical composition would

g. 3.—View from the east. Section "F" is near No. 1 Shaft at the ft of the picture and Section "D" is near No. 2 Shaft in the centre. ie prominent "horse" to which reference is made in the paper can be en between the two shafts.

indicate that, in the main, the replaced rock was basic in character. The richest disseminated ore exposed by underground operation occurs in a typical chlorite schist. Bodies of quartz porphyry occur, however, in close proximity to, and apparently within, the orebody. At the end of the crosscut of the No. 2 workings, quartz porphyry forms the hangingwall in contact with the disseminated ore, the contact being practically vertical while the dip of the rock in the orebody is from 70 deg. to 75 deg. In the disseminated ore immediately west of the solid sulphides in the east end of the same crosscut, very siliceous bands, which represent either a siliceous rock of the quartz porphyry type or a subsequent infiltration of silica during the process of mineralization are found. That silica has, to some extent at least, been associated with the replacement, is indicated by the character of the rock that has been exposed by surface workings immediately east of the 'horse'. Here the sulphides have disappeared through weathering and there is left a highly porous pumiceous silica rock which would appear to represent the result of siliceous infiltration and replacement into a rock that was probably of an acid type originally. The bands of siliceous rock in the disseminated ore in the crosscut are of a similar character. The extent of shattering that the rock has undergone on shearing has been a factor of greater importance in facilitating replacement than has the actual chemical character of the rock itself.

Replacement has taken place at a fairly high temperature and by hydrothermic processes; on the footwall particularly, the rock has been highly sericitized. In the chlorite schist and in the sercite schist as well, irregular masses of talc are encountered in the underground workings. While such mineralogical changes indicate hydrothermal deposition, it is a remarkable feature in connection with the orebody that the contact between solid sulphide and unmineralized, unchanged greenstone is so distinct, as is actually shown in the crosscuts. While both quartz porphyry and lamprophyre are rather closely associated with the deposit, there is no evidence to show that either volcanic phase is connected with the deposition of sulphides. The Kaminis granite and its offshoots seem to be the parent body from which the hot solutions and the vapours emanated. Throughout the district, sulphide bodies frequently occur in close association with quartz veins carrying gold; elsewhere, however, the sulphides are pyrite, with relatively small percentages of pyrrhotite and only occasional chalcopyrite. It would appear that during the later stages of plutonic activity now represented by the granite, the deposition of sulphides was closely connected with the precipitation of a gold-carrying quartz.

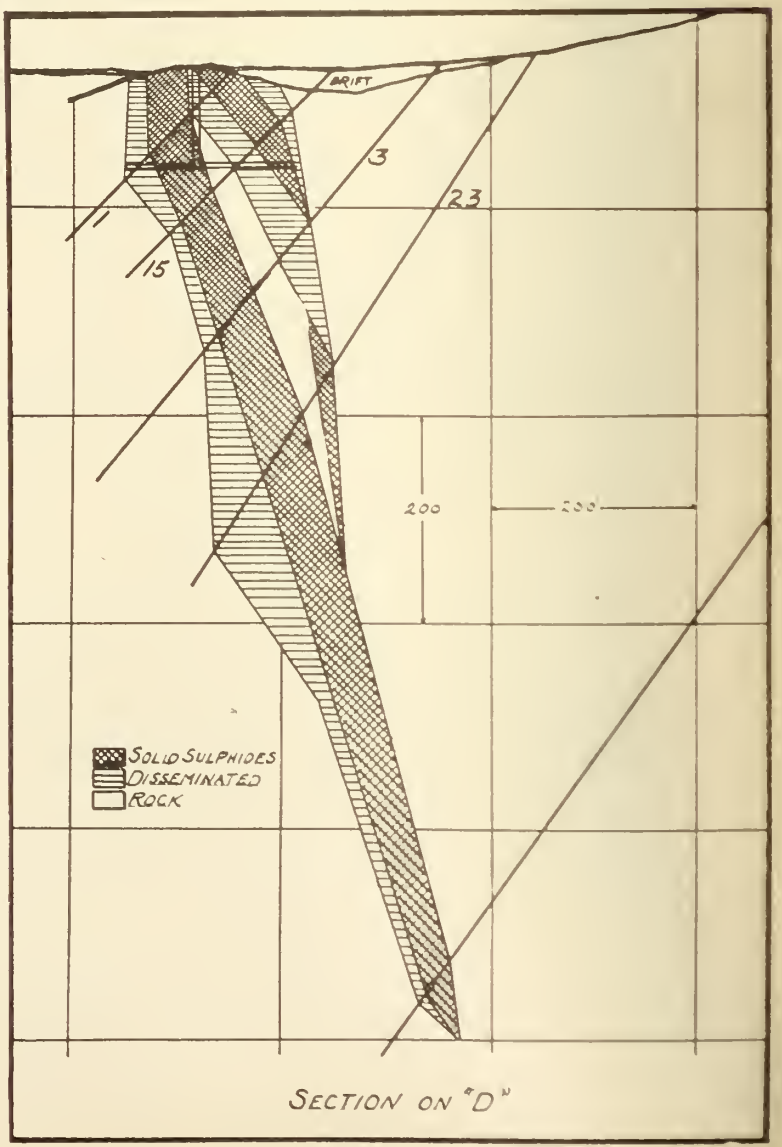


Fig. 4.—Section near No. 2 shaft as determined by diamond-drilling.

Development.

Discovery. — In the summer of 1915, the Mosher-Creighton party, which had been working northeast of Amisk lake, was guided, by information, to the Flinflon lake district and the Flinflon orebody was discovered. Some surface trenching was done in order to obtain an idea of the size of the orebody, and late in the summer the claims were recorded. The news of the discovery and the importance of the orebody were appreciated by other prospectors and in a very short time the whole country in the vicinity of the deposit was staked.

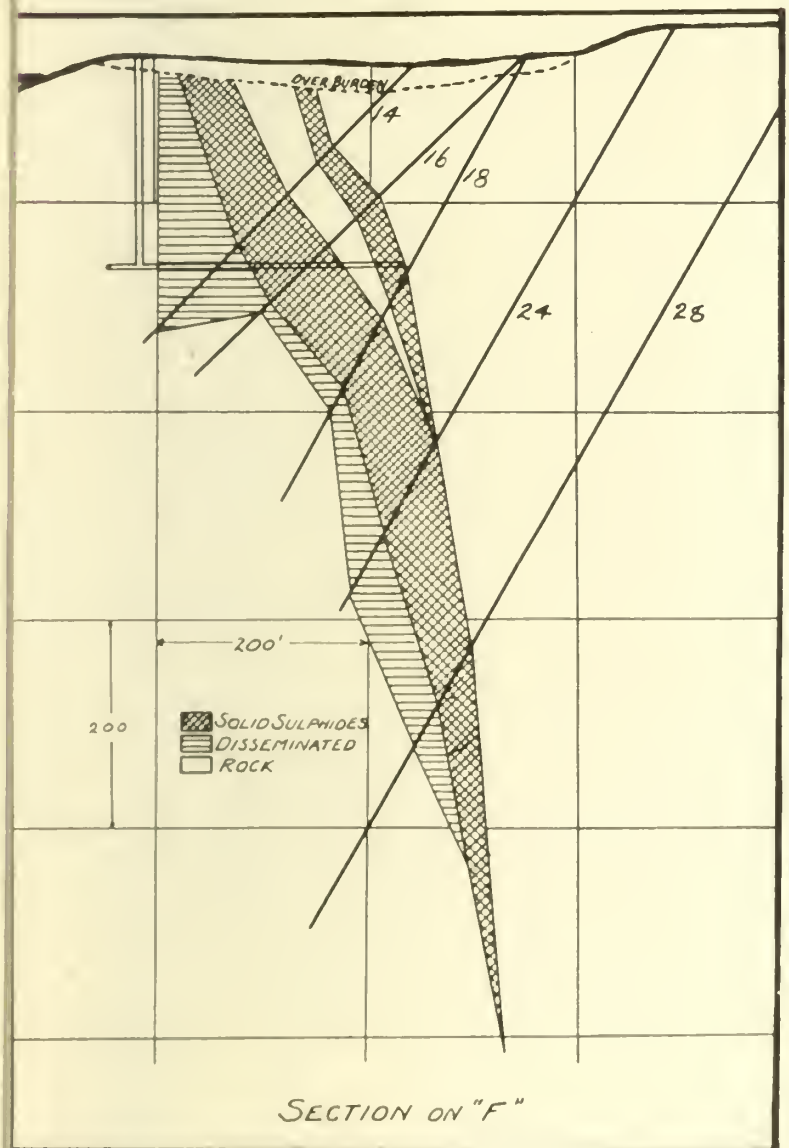


Fig. 5.—Section near No. 1 shaft as determined by diamond-drilling.

Development Work to Date. — During the winter of 1915-16, work was confined to surface sampling and cross-trenching. In March, 1916, two drills were at work and by July of the same year 6,000 feet of drilling had been done by New York and Boston interests, who, however, failed to reach an agreement with the owners. In the spring of 1917 certain Toronto interests entered into an agreement and diamond drilling was continued throughout the year and until July, 1918. In all, 11 holes were drilled representing a total lineal footage of 25,664 feet. In March, 1920, an option on the property was taken by New York and Canadian interests and since that date two shafts have been sunk over 500 feet apart at the south and north ends of the main 'horse'. The first shaft has reached a depth of 200 feet and at that depth there is 210 feet of crosscutting and approximately 100 feet of drifting southward. It was expected that the shaft should be entirely in the footwall but at a depth of 135 feet disseminated ore was encountered and the shaft continued in this ore to the 200-foot level. When the crosscutting is complete it will expose approximately 100 feet of solid sulphides. No. 2 shaft was sunk to the 100-foot level and a crosscut approximately 165 feet long was made at this level. Sinking is now being continued to the 300-foot level.

Mining and Smelting Facilities. — In operating the Flinflon property, a very large low-grade orebody, far removed at present from transportation facilities and industrial centres, there are many problems of major importance to be solved; these refer, in particular, to water-power facilities, metallurgical processes, availability of fluxing material, fuel and transportation. In order to present the situation as it is today, these various phases may best be discussed seriatim.

In order to develop water-power in sufficiently large quantity for operating a mine and smelter of 2,000 tons capacity at the Flinflon property, two sources of power are available. The one on the Churchill river at Island Falls is distant some 60 miles. A minimum production of 80,200 h.p. has been estimated for this fall. A nearer source of power, which will in all probability be adopted, is Birch rapids on the Sturgeon-Weir river, distant 35 miles from the property in a westerly direction. The minimum under present conditions is 3,270 h.p., but this may be increased at will by tapping the Churchill river at Frog portage at the headwaters of the Sturgeon-Weir water system. At periods of high water there is at the present time a natural flow of surplus water from the Churchill river into the Sturgeon-Weir system and thence into the Saskatchewan river. It is estimated that the available power can be increased to 20,000 h.p. by thus utilizing part of the flow in the Churchill basin.

The disseminated ore will offer no special difficulties in the furnaces. Generally speaking, it will concentrate fairly readily and will be treated in the reverbatory furnace. The solid sulphide (mixed pyrite-chalcopyrite-sphalerite) ore will present greater difficulties to the metallurgist. Experimental work may discover a method of concentration whereby it may be possible to recover all or the major part of the zinc. If this is not feasible, it will doubtless be treated in the blast furnace by pyritic smelting and only a limited portion of the zinc recovered. There is a great field for experimental work on this ore in order to devise the most suitable and economical method of handling and smelting the solid sulphides.

It will be necessary to add silica in considerable proportions and limestone in small amounts to the ore before smelting. Quartz veins that carry gold are more numerous on the west end of the mineral belt (Beaver lake) and at its east end (Herb lake) than elsewhere throughout the belt. The eastern district in particular is somewhat remote from the property

Apart from the gold-bearing veins there are siliceous bodies of other types in the mineral belt; in particular, quartz porphyry flows, felsitic intrusions into the earlier volcanics, and sediments with a high silica content. In all probability quartz flux will be obtained in part from the lean bodies of greater extent and closer proximity to the deposit. Magnesian limestones of Ordovician age occur in quantity within ten miles of the orebody. Pure limestones of Upper Devonian age are exposed at the northwest end of lake Winnipegosis. The use of this would necessitate a rail haul of 250 miles to the property.

Owing to the great distance from the eastern areas, Western coal will doubtless be utilized as fuel for the smelter. The success which has attended the use of pulverized coal in the experiments already carried out by Eastern copper-smelting companies, would indicate that powdered coal might be the cheapest and most available type of fuel for the smelter. It is not improbable, as well, that satisfactory electrical processes may be devised for an ore of this type many years before the deposit is exhausted.

The all-important question in connection with the development of this deposit is transportation. By air-line the property is 68 miles from The Pas, which is served by the Canadian National Railways. A railway by the most feasible route to the property would probably be 85 miles long. The province of Manitoba has displayed a very commendable interest in the deposit and in the furtherance of its development. The Board of Trade of The Pas had as their guests to the property during the month of September the members of the provincial legislature and other prominent business men in the province. The result of this visit has been that the members of the legislature have had the opportunity to become personally acquainted with the whole situation and to realize that without a railway the property cannot be operated. If, before the House meets, a deal is consummated on the property with sufficient guarantees of development, the question of the railway will be considered in the House on a basis of the province of Manitoba making arrangements to finance the building of the railway and its leasing when built, to the Canadian National Railway Board, which would then be responsible for its operation.

The heartiest acknowledgements are here made to the owners and the optionees of the Flinflon property for their generous assistance in furnishing details relative to the property and its development.

Fig. 6.—View of the Flinflon property from the south. No. 1 shaft in the foreground is near section "F."

NOTES FROM SAULT STE. MARIE.

(By a Local Correspondent.)

Michipicoten.

The Norwalk and Grace mines, which have been under negotiation for some months with a well known group of mining men, have been pumped out and sampled, but no reports of the result have yet been received by the vendors. Some phenomenally rich ore has been raised from these properties and the prospects are good that the deal will be consummated.

Work preliminary to diamond drilling the McCarthy-Webb claims is being carried on by a large gang of men, and it is expected that the drilling will be in full progress before the Spring opens.

Mile 51, A. C. R. Ont.

Test-pitting and stripping is being done on a number of claims at this point, by Mr Geo. Carufel, with a number of experienced miners. This find was made some time ago, by Mr. Jno. Byrne, and apparently is a very promising one, with many of the earmarks of a permanent gold-field.

Northern Manitoba.

Mr. J. A. Johnson, who left Soo, Ont., on the 13th inst., for the Rice Lake district, for the purpose of thoroughly examining the properties lately taken over by the Canadian Mining & Leasing Corp., is expected back next week, in company with Mr. A. J. McEwen, who preceded him in these claims. An interesting report is expected from these properties.

Power Required for Revolving Tippet

By JOHN S. WATTS, New Glasgow.

The revolving tipple, which is almost universally used in colliery bankheads, is a machine, for which the power required may vary within very wide limits, depending upon the design, and particularly upon the accuracy with which the balancing has been done. This balancing requires both the accurate locating of the car in the tipple to bring its centre of gravity, loaded and empty, at the points which will cause the tipple to revolve by gravity, and the fitting of such balance-weights to the tipple as will bring its centre of gravity to its geometrical centre.

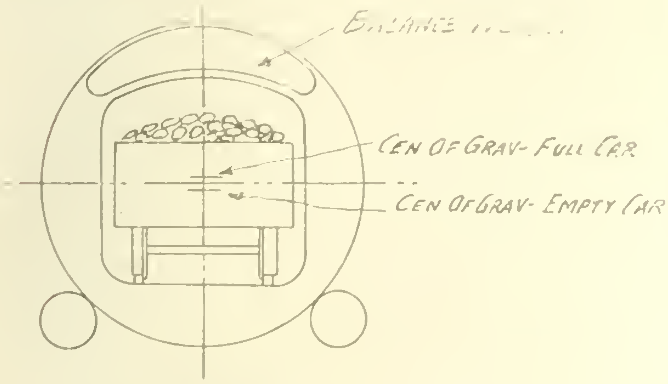


FIGURE 1.

Unfortunately from the nature of the conditions, it is practically impossible to check the accuracy of the balancing, or the location of the car, in the manufacturer's shop, and very rarely indeed, is any test made by the colliery engineers, who are usually satisfied, if the tipple performs its functions, without considering if the machine is efficient in the matter of the power used.

With coal at its present high value, and the high cost of the labor and material entering into its conversion into motive power, even a coal company will find it to pay handsomely to save all of the power possible.

The ideal to be aimed at is to have the tipple designed so that the centre of gravity of the whole of the revolving parts, including the loaded car, will be a little above the geometrical centre of the tipple, and, that, when the car is empty, the centre of gravity will be slightly below the geometrical centre.

The most satisfactory way to accomplish this is to balance the tipple itself, by fitting balance weights, to bring its centre of gravity to coincide with the geometrical centre. As the bottom of the tipple carries the rails, car-stop, trip mechanism, etc., it will be necessary to bolt weights to the top of the tipple rails, to accomplish this as indicated in figure 1.

The rails should be set at the height required to bring the centre of gravity of the loaded car just above the geometrical centre of the tipple as indicated in figure 1, and the centre of gravity of the empty car an equal amount below the centre line.

When the tipple has revolved about ninety degrees, the car will begin to empty itself and unless an apron has been fitted, as shown in figure 2, the centre of gravity will move to the left hand side of the vertical centre line, and power will be required to revolve the tipple. With the apron fitted as shown, the centre of gravity remains on the right hand side of the vertical centre line, and gravity will keep the tipple revolving until it has completed one half of its revolution, when the car will be completely emptied of coal.

At this point, the tipple may be described as being on a dead centre, as the centre of gravity will be on the vertical centre-line, but the inertia of the moving parts should be sufficient to carry the tipple past this point, without taking additional power.

Having passed this point, the centre of gravity has moved to a point above and to the right of the centre of the tipple, and gravity will cause the tipple to complete its revolution.

Under the ideal conditions outlined above, the power that will be required is simply that needed to overcome the friction of the moving parts. To calculate the amount of this power, we add together the weights of the moving parts of the tipple, and of the loaded car. This weight acts on a vertical line, and is resolved into two diagonal forces, as shown in figure 3. The amount of these resultant forces can be scaled off the triangle of forces in figure 3, and the total of the two resultants will be the pressure on the bearings, which multiplied by the co-efficient of friction will give us the resistance to be overcome at the surface of the roller shafts.

This resistance in pounds, multiplied by the peripheral velocity of the roller shaft, divided by 33,000, will give the horse-power required at the roller shaft, and adding about 10 per cent to this amount to overcome the friction of the driving gear, will give us the horse power required. Converting this into a formula we have

$$HP = \frac{W \times 2 \times \sec. \text{ang.} \times F \times d \times \pi \times R}{33{,}000 \times 12}$$

Where W = total moving weight, including loaded car, in pounds.
F = co-efficient of friction.
d = diameter of roller shaft in inches.
R = revolutions per minute of roller shaft.

The average tipple will have a weight of the moving

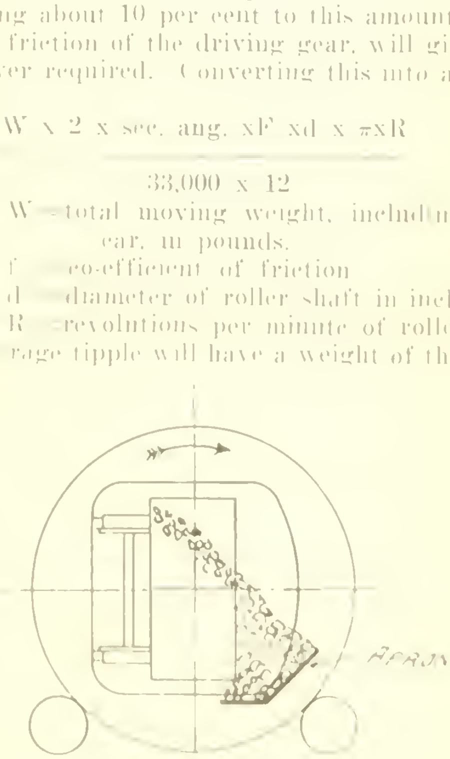


FIGURE 2

parts of about 5,000 pounds, and taking the car at 1,250 and the weight of the coal at 2,000 pounds, the total weight to be moved will be 8,250 pounds. The coefficient of friction of the roller shaft bearings should not exceed .2. The angle will be around 45 degrees, the diameter of the roller shafts, say 3 inches, and the speed of the roller shafts about [illegible] revolutions per minute. Substituting in the above formula we get

$$HP = \frac{8250 \times 2 \times 1.414 \times .2 \times 3 \times 3.14 \times 33}{33{,}000 \times 12} = 3.6 \text{ HP}$$

Adding ten per cent for the friction of the driving apparatus, we arrive at a total of 4 HP, which should be required only to start up the tipple.

As it is possible that a car may come to the tipple only partly loaded, it is desirable to have the driving mechanism capable of turning over the tipple with a partly-filled car.

The worst possible condition will be a car filled with coal up to the centre line of the tipple, and the additional work required will be equal to that which the coal above the centre line performs in a full car.

This can be calculated by multiplying the weight of the coal, assumed to have been left out, by twice the height of the centre of gravity of this mass of coal, above the centre of the tipple, in feet. That being the distance this mass would fall during one

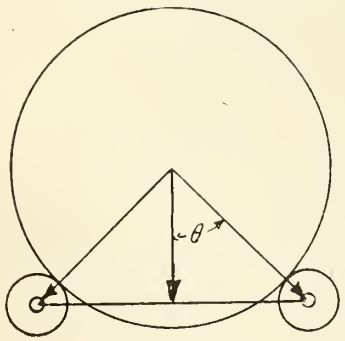


FIGURE 3

half of a revolution the foot pounds per minute will be the above amount multiplied by the number of revolutions per minute of the tipple. Putting this into a formula, we have,

$$HP = \frac{c \times 2 \times h \times rpm}{33000}$$

Where c=weight of coal left out in pounds
h=height of centre of gravity of "c", above centre tipple.

Unless the car is very high and narrow, the extra power required will not be more than about one-quarter horse-power.

Another disadvantage that is incurred, in using a badly balanced tipple, and one that is of more consequence even than the extra power used, is that the tipple depending entirely upon the friction between its rings and the live rollers, is apt to slip if the unbalanced weight is any appreciable amount, particularly in frosty weather. This will soon ruin a tipple, as the wear on the rings coming always on the same spot, soon wears a flat spot there, which makes it still harder to start. Also a delay at the tipple will hold up operations throughout the whole bankhead, and cause a serious delay.

WOMEN'S MINING ASSOCIATION.

The Toronto Branch of the Association of the Women of the Mining Industry of Canada was formed at a largely attended meeting of women held at the residence of Mrs. R. F. Segsworth, South Drive, Toronto, a few days ago. The organization is wide in its scope and promises great usefulness in its cooperation with the mining industry of the country. Briefly stated the objects of the Branch are to promote social intercourse, to render service to all connected with the mining industry and to encourage cooperation in work for the benefit of the community and of the country at large in all that pertains to the interests of the mining industry.

Not only will the new society include the wives and women folk of engineers and owners, but it will have in its membership all women whose men are mine workers. A Montreal branch of the organization will be formed this week in Montreal, and local branches will shortly be formed in the mining centres of the North, in British Columbia and in Nova Scotia. These local branches will then be drawn into a Dominion Federation which will affiliate with the similar organization now existing in the United States.

Toronto will have its hospital visiting committee to look after patients sent in from the North, and will also have a committee to search out strangers.

Officers Elected.

Officers for the year will be: President, Mrs. J. B. Tyrrell; Vice-Presidents: Mrs. D. A. Dunlap, Mrs. R. F. Segsworth (who goes as Toronto's delegate to the meeting for organization in Montreal), Mrs. Sylvester; Recording and Corresponding Secretaries, Mrs. J. Pat. MacGregor and Miss Miller; Treasurer, Mrs. V. E. Neelands; Councillors: Mrs. Tom Gibson, Mrs. Macqueen, Mrs. Robert Bryce, Mrs. W. A. Parks; Conveners of Committee: Mrs. Arthur Miles, Mrs. McEvoy and Mrs. Hanltain.

An interesting visitor at yesterday's meeting was Mrs. Frecheville, wife of the head of the English Society of Mining and Metallurgy. Mrs. Frecheville made a brief speech, explaining the workings of the women's branch of that society.

Now that the movement is started it is hoped that branches will be formed throughout Northern and other parts of Canada will be formed. The Canadian Mining Journal is asked to state that copies of the constitution and other information may be obtained from the corresponding secretary, Miss Miller, 21 Howland Avenue, Toronto, Ont.

"BUNK."

Copper Cliff, Ont.
February 28, 1921.

The Editor,
The Canadian Mining Journal,
Gardenvale, Que.

Dear Sir,

The reference to cubicular galena under the heading "Technical Jargon" is a good example of the "bunk" we sometimes meet in the technical reports. I guess "bunk" is right considering the meaning of cubicular, but the Funk & Wagnall's dictionary goes one better with the definition "suitable for lying on."

Yours very truly,
J. C. ROGERS.

PROTECTION AND POLITICS.

Those in Congress who have the interests of the coal industry at heart have been asleep on the job. The new emergency tariff bill, said to be at once the pest and pet of stand-pat Republicans, should contain protection for the coal industry. We suggest at least $5 a ton as the proper tariff on coal imports necessary to put this industry on a parity with field corn and hens' eggs. How anyone could have overlooked this crowning climax to the season's farce is more than we can understand. Maybe the votes of those who mine coal are not among those sought.—"Coal Age" New York.

Northern Ontario Letter

THE SILVER MINES

The Cobalt District.

The closing days of February found silver quoted at a price actually lower than any monthly average since the year 1915. Companies which commenced hoarding their bullion output a year ago have lost heavily, and are now faced with selling on a market between 55 and 60 cents an ounce, as compared with upwards of $1.20 an ounce at the time when they commenced to withold their product from the market.

There is a growing tendency now to believe that two factors can alone relieve the situation. One would be the adoption of bi-metallism by international Agreement, which it is thought may soon be formally proposed by Great Britain. This would probably cause a higher price to be fixed, depending upon the ratio decided upon. As for instance a ratio of sixteen of silver to one of gold would place a valuation of $1.29 an ounce on silver. The other remaining hope of relief lies in the possibilities of reducing the costs of production.

Workers in the Cobalt mines have voted by a large majority in favor of asking for a Board of Conciliation to deal with the question of the reduction in wages which went into effect Feb. 16th. The mining companies will agree to the proposal, but believe such a procedure quite useless. The decline in the price of silver to 56 cents an ounce during the past few days, as compared with the high point of $1.37 an ounce reached in January, 1920, in the opinion of the operators, privides ample justification for the reduction of 15 p.c. in wages. It is intimated that an endeavor may be made to do co-operative buying of supplies and provisions so as to enable the men to reduce the cost of living to as a great an extent as the cut in wages.

About 300 tons of ore, containing an average of about 15 ounces to the ton, has been broken in the Hudson Bay mine. A further substantial tonnage has been placed in sight, and arrangements are being made to resume shipments about the first of May. The work at the 3rd level, which recently opened up some new ore, is being continued with fairly promising prospects.

Work both above and below the contact is being continued on the Hargraves property, under option to the Kerr Lake. Some high grade ore was encountered soon after the work commenced, but proved to be only a small pocket. The Kerr Lake is working a total force of about 50 men, production having been entirely suspended last fall, and development work narrowed down to a minimum. The question of increasing the scope of operations in the Spring will be determined largely by quotations for silver as well as the extent of the decline in the cost of material.

Ore being shipped to the mill from the Bailey Silver Mines averages around 19 ounces of silver to the ton. Part of this is coming from work at the 5th level, and part from the dump. Mill heads have recently run as high as 16 ounces to the ton, but with 19 being about the average. The low price of silver is proving to be a serious handicap, however and a meeting was held in Toronto during the past week to discuss the question of how best to combat the difficulty. E. J. Bourne, manager of the mine, went to Toronto to attend the meeting.

South Lorrain.

Just now, the Haileybury Frontier is the only property operating in the South Lorrain district. The activity on this property depends more upon the demand and price for cobalt metal than it does for silver.

At the Keeley Silver Mines, although a large tonnage of medium-grade ore is awaiting treatment, and a 75-ton mill was installed last Summer and is ready for operation, yet it is considered quite uncertain as to whether or not the Spring will witness a resumption of work. A re-calculation of the resources may have to be made, based upon the lower price of silver. Both the tonnage available and the margin of net profit may be narrowed down considerably as a consequence. The extent of this narrowing down will depend on the extent to which production costs can be lowered.

Elk Lake and Gowganda.

A meeting of the shareholders of the Cane Silver Mines was held last week in Haileybury, at which the question of making arrangements to resume work was considered. Slight difficulties had previously arisen which caused a suspension of work some time ago. In discussing the matter with your correspondent, one of the interests in control of the stock declared the outlook quite promising for an early resumption of operations.

Following a reduction in wages at the Castle property of the Trethwey company in Gowganda, the men quit work. Few forces of men were soon engaged and sent to the property.

Arrangements have been about completed whereby the Walsh property will be re-opened this Spring. It is also learned the Silver Bullion property will be re-opened, both properties being under one control. Encouraging amounts of silver ore occur in the workings on these properties, and an effort will be made to place them on a producing basis. The work will be superintended by Robert Gamble.

The likelihood of any subsequent decision to provide railway transportation for the Gowganda silver are a selecting Elk Lake as the point to start from is added to by reason of an unfavorable geological report on the twelve miles or so of territory lying between Swastika and Fort Natachewan along the route which certain interests had advocated as more suitable than from Elk Lake. This leaves Elk Lake as a probable point of beginning, as the territory in all direction from Elk Lake is considered to be of good prospective merit.

THE GOLD MINES

The Porcupine District.

According to present plans, practically every milling plant in the gold mining areas of this part of Northern Ontario will be shaping up for operation with the next few weeks. Also the mills already in operation will be so speeded up as to double the present rate of production at the leading mines. Altogether, the output may attain an aggregate of about $1,500,000 monthly some time during the latter half of the year, from the mines of Porcupine and Kirkland Lake. A production of around $18,000,000 during 1921 is indicated.

Last week's report in the "Journal" that the McIntyre would increase its milling equipment has been confirmed, and additional grinding equipment is being ordered. This will enable the McIntyre to increase its earnings considerably. The physical condition of the property has been greatly strengthened during the past few months as a result of exploration and development work on what is believed to be the easterly continuation of what is known as vein No. 81 on the Hollinger.

Cornish miners imported to the Dome Mines last Fall from the Old Country, have developed into first class workmen, and have established a high degree of effici-

ency. Their first work on machines was not very satisfactory, but their willingness soon found them achieving satisfactory results, and they are now very efficient. It is believed that, beginning with the company's fiscal year dating from April 1st, the Dome will be in a position to operate at a cost of not more than $3.75 a ton, or a rate equal to about fifty per cent. higher than the pre-war cost. This indicates a large margin of net profit on the higher average grade of ore as found at depth.

Part of the mining machinery sold by the Dome Lake Mining Company is being installed on the North Davidson property where arrangements are being made to carry on a quite extensive program of exploration and development work. Previous diamond drilling is stated to have provided encouragement to go ahead with underground operations.

Official information is scarce in regard to results achieved in the cross-cut at the 250-ft. level of the Porcupine-Keora property, in the northern part of the township of Whitney. It is reported in usually well-informed circles, however, that while some of the stringers occuring over a wide body contained high values, yet the average gold content of the body is quite low.

The Kirkland Lake District.

The status of the mining industry as found in Kirkland Lake is summarized in more or less detail elsewhere in this issue of the "Journal."

Good results are reported at the Hunton-Kirkland where commercial ore is being opened up during the course of sinking a main shaft. This fact, taken together with the official statement that the treasury contains around 750,000 shares leads to the belief that no serious difficulties will be experienced in raising the money required to carry out the proposed development work.

Work is progressing satisfactorily at the Argonaut Gold Mine, at Beaverhouse Lake some twelve miles east from Kirkland Lake. The main, or No. 3 shaft is being driven to a depth of 500 feet, and is expected to reach that point within the next month or six weeks. Considerable encouragement was met with at the 200-ft. level and the program at the 500-ft. level is considered to be of much importance. Success here would have a vital influence on subsequent prospecting over a comparatively large area in the vicinity of the Argonaut, where favorable geological conditions occur.

The annual meeting of the Goldfields, Ltd., of Larder Lake, was held in Toronto during the past week, and the voting showed the Associated Goldfields seemed to control about 1,800,000 shares as against 135,000 by the minority who which are taking legal steps to prevent sale of the company's assets to the Associated Goldfields, or the newly incorporated Canadian Associated Goldfields, which has an authorized capital of 30,000,000 shares of the par value of $1 each.

During the month of January the Lake Shore mine produced gold to the value of $37,375. In doing this, the mill ran only 82 per cent. of the possible running time. A total of 1,674 tons of ore was treated, the average recovery being $22.32 per ton.

A feature of an official statement just issued by R. C. Coffey, manager, is a summary of work at the new level established at a depth of 600 feet. The station at this level has been completed, and two crossents as well as one drift have been commenced. Another feature is the increase in mill heads to $22.32 from a little over $18 in December.

British Columbia Letter

A thorough mineral survey of the Esquimalt & Nanaimo Ry. Belt, Vancouver Island, an area of over 2,000,000 acres, is to be undertaken immediately by the Canadian Pacific Ry. Company, through its subsidiary corporation, the Canadian Consolidated Mining & Smelting Co., of Trail, B. C. Engineers will be engaged to inspect all prospects that have not passed out of the hands of the Company and geologists will make reconnaissance of the mineralized zones of the district. The intention is to obtain as complete information as the application of scientific principles and knowledge will permit of its mining possibilities of preliminary to entering into an agreement with the Provincial Government for the elimination of what is commonly described as the "Dual Control of Minerals within the E. & N. Belt."

Hon. Wm. Sloan, Minister of Mines, has been working on the problem of bringing the minerals of the Belt within the sole jurisdiction of the Province since 1918. The progress made has not been as satisfactory as he could have wished because of the reluctance of the Company to release underground resources without a more exact knowledge of their economic potentialities. Considerable, however, has been accomplished.

The Company has been brought to realize that the present situation, requiring that title to mineral lands within the area, must come both from the Province and the Company, cannot continue. That this point is conceded is supported by letters from Mr. E. W. Betty, President of the C. P. R., stating that the survey referred to will be started without delay. It is assumed that if, as a a result of this work deposits of value to the Consolidated Company are found, that concern will undertake their development. The minerals of the entire section then would be turned over for administration solely by and under the laws of the Province.

Attention also has been directed to the possibilities of the mineral bearing zones of Vancouver Island. It is not improbable that this field work will disclose deposits as rich in promise, for instance, as the Sunloch Mine, Jordan River, is reported to be; in fact the prospects of finding large deposits of copper bearing ore are good. Should such expectations be borne out it would mean the establishment of a smelting, and possibly a refining plant, by the Consolidated Company on the Coast. That this corporation has been feeling its way towards such an extension of industry has been common knowledge for some time. It has under development a number of important properties on Vancouver Island. The discovery and opening up of another one or two within the E. & N. Belt would settle the question and, with a steady normal copper market, an important mining industry would be assured.

The Government's proposition to the Company, which no doubt will furnish the basis of negotiations as soon as the survey is completed, may be summarized as follows:

"That, as regards the mineral rights within the E & N. Railway Belt remaining unalienated, the Government is prepared to go practically into partnership with the Railway Company.

"The District to become fully under the operation of the Mineral Act as far as underground mineral rights are concerned; that such mineral rights be administered by the Government; that the cost of such ad

ministration be entirely borne by the Government and that the gross receipts of all revenue received by the Government from and on account of such mineral rights including taxes etc., be divided equally between the Government and the E. & N. Railway."

Correspondence gives details of the efforts made by the Department of Mines to obtain a decision from the Company. Clearly the matter was kept before the officials of the Company and quite as obviously the latter displayed anxiety not to be hurried into any adjustment that, from their standpoint, might be termed ill-considered. The ultimate result, however, were two interesting letters from Mr. Beatty, President of the C. P. R. The first reads as follows:

Montreal, 15th November, 1920.

The Honourable William Sloan,
Minister of Mines,
Victoria, B.C.

Dear Mr. Sloan:—

Your letter of the 3rd inst., relative to the negotiations pending with regard to the minerals in the unsold lands in the E. & N. Railway Company's land grant, was duly received.

You will readily concede that the matter is one of very considerable importance to the Railway Company. We are advised by persons competent to judge that in all probability there are valuable deposits of minerals in the land grant—the properties already being worked by the Consolidated Company, such as the Sunloch, are evidence of this fact.

In the circumstances naturally the Company desires to acquire as much knowledge as possible of the mineral values in their lands before concluding the pending negotiations, and with this end in view it is proposed, as early as possible, to do extensive exploratory work which will involve the expenditure of a large sum. We are arranging for the co-operation of the Consolidated Company in this connection.

I can assure you that the Company is at one with the Government in its desire to see the mineral resources of the land grant developed, and the negotiations can be continued when we have the data desired.

Yours very truly,
(Signed) E. W. BEATTY.

In replying to the foregoing Mr. Sloan said in part: "With regard to your statement as to proposed exploration of the mineral resources of the area in question I should be glad if you could let me have more exact information as to the nature and extent of said exploration, when it will be inaugurated when it is expected to be completed, and the expenditure likely to be involved."

To this came the following response:

Montreal January 25, 1921

Hon. Wm. Sloan, Minister of Mines,
Victoria, B.C.

Dear Mr. Sloan:—

I duly receive yours of the 29th ultimo.

It would be impossible at the present time to give any categorical answer to your questions, for the reason that the nature and extent of our operations and the amount of money which we will spend upon them will necessarily be determined by results and prospects as the work proceeds.

All I can say at the moment is that as soon as weather conditions permit, the Consolidated Mining & Smelting Co. will make a preliminary examination of the most probable mineral bearing lands in the belt and that their report and recommendation will receive our prompt consideration.

Yours very truly,
(Signed) E. W. BEATTY,
President.

COLLIERIES.

The coal production of the collieries of British Columbia for the month of January shows a decline in comparison with that of December in respect of the Canadian Collieries (D) Ltd. and the Crow's Nest Pass Coal & Coke Co. The former has dropped from 67,327 to 60,038 tons while the latter produced at Coal Creek in January 27,983 as against 42,800 for December and at Michel 23,544 tons in January, the December output being 26,744 tons. The Canadian Western Fuel Co., of Nanaimo, B.C., however, makes a better showing in January than in December the respective figures being 57,228 tons and 52,796 tons.

Following are the detailed figures for January:

Vancouver Island Field.

	Tons.
Canadian Western Fuel Co., Nanaimo	57,228
Canadian Collieries (D) Ltd., Comox	37,763
Can. Collieries (D) Ltd., South Wellington	6,441
Canadian Collieries (D) Ltd., Extension	15,834
Nanoose-Wellington, Nanoose Bay	5,174
Granby Company, Cassidy	19,532
	141,972

Nicola-Princeton Field.

Middlesboro Collieries Ltd., Merritt	9,503
Fleming Coal Co., Merritt	3,644
Coalmout Coal Co., Coalmont	3,712
	16,859

Crow's Nest Pass Coal Field.

Crows Nest Pass Coal Co., Coal Ck.	27,983
Crows Nest Pass Coal Co., Michel	23,544
Corbin Coal & Coke Co., Corbin	6,055
	57,582

An inquiry has been ordered by the Provincial Government into the cost of the production of coal by the operators on the coast of British Columbia, the cost of its transportation, screening and delivery by the dealers, the profits made by the collieries and the profits of the dealers. Alexander Henderson, K.C., a prominent lawyer of Vancouver, B.C., has been commissioned to make the investigation and his work will commence immediately as the time given to present a report is little more than a month. Mr. Henderson's commission comes as a result of a widespread agitation, centered in Vancouver City, against the high cost of coal, it being alleged that $15.00 a ton for domestic coal in a city within forty or fifty miles of the collieries must mean that someone, either the operators or the dealers, is making an excessive margin. The criticism has been answered by the operators by reference to the increased wages, high costs of supplies, and the exceptional difficulty attached to working the coal seams of Vancouver Island. Little has been heard from the dealers but they are said to be ready to defend their position. Mr. Henderson has been given wide powers and the result, there is no doubt, will be watched with close attention and keen interest by the general public of this Province.

There is another development to the litigation between the E. & N. Ry. Co. and the Granby Co. [illegible]

ed Mining Smelting Co. as to the ownership of coal rights in certain sections of the Vancouver Island Railway Belt. Recently a judgment was handled down that one of the two adjoining areas, the Dunlop Estate, belongs entirely, surface and under-surface, to the Granby Company but that the other, the Ganner Estate, in respect of the under-surface rights, belongs to the E. & N. Ry. Co. It appears that one of the mine entrances in connection with the Cassidy Collieries is on the Ganner Estate and the Court of Appeal has given permission to the operating company to use this approach to the workings located within its property, with the stipulation that no coal is to be taken from with Ganner Estate. In his argument S. S. Taylor, for the Granby Company, stated that, if access to the Company's workings was forbidden, 1,700 people would be thrown out of employment and plant representing an investment of $19,000,000 would be closed down. The question of the ownership of the underground rights within the Ganner Estate will be fought out in the courts to the final court of appeal, namely, the Privy Council.

STANDARD STOCK EXCHANGE QUOTATIONS.

Silver	High.	Low.	Last.
Aladdin Cobalt	2	1¾	1⅞
Bailey	3¾	3¾	3¾
Beaver Consolidafed	39	38½	39
Chambers-Ferland	9½	8	8
Coniagas	2.05	2.05	2.05
Crown Reserve	20	16	20
Hargraves	1½	1¼	1¼
La Rose	28	25½	25½
McKin.-Dar.-Savage	30	28	30
Mining Corp. of Can	1.11	1.11	1.11
Nipissing	9.25	8.90	9.00
Ophir	1½	1½	1½
Peterson Lake	8	8	8
Temiskaming	27	26¾	26¾
Trethewey	18	16½	16½
Gold.			
Apex	2⅛	2	2⅛
Atlas	25	22	22
Boston Creek Mines	10	10	10
Dome Lake	3⅛	3	3⅛
Dome Mines	18.75	16.50	17.75
Gold Reef	4⅜	4	4
Hollinger Cons.	6.80	6.51	6.65
Hunton Kirkl'd G. M.	10½	10	10
Keora	19	17½	17½
Kirkland Lake	53	49½	50
Lake Shore M. Ltd.	1.20	1.16	1.16
McIntyre	2.00	1.96	1.99
Moneta	11	11	11
Newray Mines, Ltd	9	8	9
Porcupine Crown	23	22	23
Porcupine V.N.T.	22½	21	22
Preston East Dome	3¾	3½	3¾
Schumacher	25½	25	25
Skead	25	20	25
Teck-Hughes	10½	10	10½
Thompson Krist.	7½	7½	7½
West Dome	9½	7½	8½
West Tree Mines Ltd.	5⅛	5	5
Miscellaneous.			
Ajax Oil	34	30	30
Eureka	17	17	17
Rockwood Oil, Gas	3	2¾	3
Vacuum G.	19	16	16

MONTREAL METAL QUOTATIONS.

Following are fair average prices for ingot metals (in less than car-load lots) at Montreal:

	Cents per pound. Feb. 23rd.	Mar. 2nd.
Copper, electro	17½	17½
Copper, casting	17¼	17
Tin	37½	37
Lead	6	5½
Zinc	7½	5½
Aluminum	35	35
Antimony	7½	7½

TORONTO COAL PRICES.

Toronto, March 2.—Conditions are unchanged in regard to the coal situation. The difficulty in moving anthracite coal still exists. The smokeless market runs at from $8 to $8.50, Toronto and slack is quoted at $1.75 to $2.75 at the mine. Lump coal ranges anywhere from $2.50 to $3.50, the quotations on both slack and lump depending to a large extent upon the grade of the product offered. Anthracite prices are: egg, $8.25; stove and nut $8.50 and pea coal $6.50 at the mine.

ASBESTOS CORPORATION OF CANADA.

The operations of the Asbestos Corporation of Canada in 1920 were the most profitable in its history, reflecting the heavy demand and high prices that have favored Canadian asbestos producers in recent years.

The President, Mr. W. G. Ross, in his report to the shareholders, referred to the business outlook as follows:

"The orders on the company's books are as great as the orders on hand a year ago. European demand has improved. In the United States, while requests of a temporary nature for suspension of shipments have been made, indications are that industries in which we are principally interested, such as the building and automobile industries, will improve.

"With regard to the latter, our special products are required for renewals, especially brake band linings. The commercial vehicle is becoming a greater factor in the transportation of commodities, and the use of motors of all kinds is increasing steadily, each succeeding year bringing greater needs for and users of cars, both passenger and goods."

Net income available for common stock dividends, after deduction of bond interest, renewals, and depreciation, compared with previous years as under:

	1920	1919	1918
Net income after deductions	$ 1,048,940	$ 1,008,071	$ 801,927
Dividends	582,500	530,000	190,000
Surplus carried for'd	466,440	478,071	611,927
Total surplus	2,052,831	1,586,390	1,205,819

PERSONAL.

"Mr. Carl A. Wendell, for the past few years Chief Engineer of the American Ore Reclamation Co., 71 Broadway, New York, and previous to that connected for several years with the U. S. Steel Corporation has been retained by the General Briquetting Company at 25 Broad St., New York, as consulting engineer, in connection with its flue-dust briquetting development. He will also specialize in coal washing and coal briquetting. Mr. Wendell has specialised in the reclamation of fine materials."

BOOK REVIEW.

COST OF MINING.—A Discussion of the Production of Minerals, with remarks on the Geologic, Social and Economic Foundations upon which it rests. By James Ralph Finlay. Third Edition revised and enlarged. 9 by 6 inches. 532 pages with Index. McGraw-Hill Book Co., New York.

Editorial recommendation of this work as a necessary part of every mining engineer's and mine accountant's library is made elsewhere in this issue, and need not here be repeated.

The book deals specifically with the cost of mining coal, iron ore, copper, lead, silver-lead, zinc, gold and silver, giving exact statistical information at specific localities and under definite geological conditions of occurrence. Generalizations under these heads are conspicuously absent.

In very illuminating fashion the application of general principles of geology, accounting and common sense to mining are discussed.

The work does not attempt to discuss mineral occurrences outside of the United States, except in a cursory manner, and the only extended reference to Canadian minerals concerns silver mining at Cobalt. The opening chapter, which discusses mineral production as a source of national power, puts forward some sane views as to the tremendous preponderance of such power possessed by the English-speaking peoples, and their ability to use mineral wealth by reason of a highly developed mechanical industry. One penetrating phrase which may not be as favorably viewed by certain sections of Canadian thought as it should be, is as follows: "One great advantage possessed by the Anglo Saxons is plenty of room. We are not oppressed by the terrors of over population. Why encourage that terror and bring it nearer by hastening the growth of population by promoting immigration in to these vast areas? We talk sometimes of 'undesirable neighbors.' Is not too great a multitude of neighbors of whatever kind essentially undesirable?" Which suggests a question that has an uneasy habit of intruding in considering Canadian emigration propaganda.

Prof. Ingall's more general remarks, however, form only a small part of his book, which contains a well ordered and selected collection of statistical date that is too condensed, and at the same time, too extensive to permit of reviewing except by actual quotation.

PERSONALS.

Mr. Wm. Frechville, of London, Eng., is in Toronto. Mr. Frechville is prominently connected with several mining enterprises and has on several previous occasions visited Canada. He is a past president of the Institution of Mining and Metallurgy.

Mr. G. C. Bateman, manager of La Rose Consolidated Mines, has been nominated as a councillor of the C. I. M. M. for the coming year.

Mr. C. V. Corless, manager of the Mond Nickel Co., will be president of the Canadian Institute of Mining and Metallurgy during the coming year.

A meeting of the Toronto branch of the C. I. M. M. is to be held on Saturday, Feb. 26. Proposed legislation for engineers will be discussed.

Mr. Jas. McEvoy, who has been examining coal lands in British Columbia, has returned to Toronto.

PROVINCE OF QUEBEC

MINES BRANCH

Department of Colonization, Mines and Fisheries

The chief minerals of the Province of Quebec are Asbestos, Chromite, Copper, Iron, Gold Molybdenite, Phosphate, Mica, Graphite, Ornamental and Building Stone, Clays, etc,

The Mining Law gives absolute security of Title and is very favourable to the Prospector.

MINERS' CERTIFICATES. First of all, obtain a miner's certificate, from the Department in Quebec or from the nearest agent The price of this certificate is $10.00, and it is valid until the first of January following. This certificate gives the right to prospect on public lands and on private lands, on which the mineral rights belong to the Crown.

The holder of the certificate may stake mining claims to the extent of 200 acres.

WORKING CONDITIONS. During the first six months following the staking of the claim, work on it must be performed to the extent of at least twenty-five days of eight hours.

SIX MONTHS AFTER STAKING. At the expiration of six months from the date of the staking, the prospector, to retain his rights, must take out a mining license.

MINING LICENSE. The mining license may cover 40 to 200 acres in unsurveyed territory. The price of this license is Fifty Cents an acre per year, and a fee of $10.00 on issue. It is valid for one year and is renewable on the same terms on producing an affidavit that during the year work has been performed to the extent of at least twenty-five days labour on each forty acres.

MINING CONCESSION. Notwithstanding the above, a mining concession may be acquired at any time at the rate of $5 an acre for SUPERIOR METALS, and $3 an acre for INFERIOR MINERALS

The attention of prospectors is specially called to the territory in the North-Western part of the Province of Quebec north of the height of land, where important mineralized beltsare known to exist.

PROVINCIAL LABORATORY. Special arrangements have been made with POLYTECHNIC SCHOOL of LAVAL UNIVERSITY, 228 ST. DENIS STREET, MONTREAL, for the determination, assays and analysis of minerals at very reduced rates for the benefit of miners and prospectors in the Province of Quebec. The well equipped laboratories of this institution and its trained chemists ensure results of undoubted integrity and reliability.

The Bureau of Mines at Quebec will give all the information desired in connection with the mines and mineral resources of the Province, on application addressed to

HONOURABLE J. E. PERRAULT,
MINISTER OF COLONIZATION, MINES AND FISHERIES, QUEBEC.

BRITISH COLUMBIA

The Mineral Province of Western Canada

Has produced Minerals valued as follows: Placer Gold, $75,722,603; Lode Gold, $100,272,431 ; Silver, $50,432,304; Lead, $43,821,106; Copper, $153,680,965; Zinc, $16,818,487 ; Coal and Coke, $199,123,323; Building Stone, Brick, Cement, etc., $29,991,757; Miscellaneous Minerals, $786,918; making its mineral production to the end of 1919 show an

Aggregate Value of $670,649,894

The substantial progress of the Mining Industry of this Province is strikingly exhibited in the following figures, which show the value of production for successive five-year periods : For all years to 1895, inclusive $94,547,241; for five years, 1896-1900, $57,605,967; for five years, 1901-1905, $96,509,968; for five years, 1906 1910, $125,534,474; for five years, 1911-1915, $142,072,603; for the year 1916, $42,290,462; for the year 1917, $37,010,392; for the year 1918, $41,782,474; for the year 1919, $33,296,313.

Production During last ten years, $322,829,310

Lode-mining has only been in progress for about twenty-five years, and not 20 per cent. of the Province has been even prospected ; 300,000 square miles of unexplored mineral bearing land are open for prospecting.

The Mining Laws of this Province are more liberal and the fees lower than those of any other Province in the Dominion, or any Colony in the British Empire.

Mineral locations are granted to discoverers for nominal fees.

Absolute Titles are obtained by developing such properties, the security of which is guaranteed by Crown Grants.

Full information, together with Mining Reports and Maps, may be obtained gratis by addressing

THE HON. THE MINISTER OF MINES
VICTORIA, British Columbia

EDITORIAL

A Historical Meeting

Comment on the successful character of the annual meetings of the Institute in recent years has been so regularly required that similar remarks upon the most recent function at Montreal may savor of triteness, but there was a distinction about this gathering that was new, reflecting important happenings of the previous twelve months that have made mining history, and have marked new heights of progress from which clearer vision of our national future has been attained.

The historical nature of the meeting became evident, as the members successively heard that the preceding year had seen the highest mineral production value and the largest coal output in Canada's history; the largest numerical membership and revenue in the Institute's records; had witnessed the discovery of petroleum in the Far North, and the most intensive prospecting and accretion of new geological facts that any year has ever had in Canada; has demonstrated the notable value and undoubted permanence of gold occurrence in Northern Ontario, a wonderful enlargement of asbestos markets and some very cheering developments in regard to the zinc deposits of Gaspesia, and certain significant developments in Northern Manitoba and Alberta that were prominently brought out at the Winnipeg meeting, not neglecting to mention the rejuvenescence of mining in the Yukon that seems likely to follow the silver discoveries at Keno Hill in the Mayo District.

Concerning all these things the members received firsthand and advance information, and the ancient and honorable tradition of the Canadian Geological Survey in regard to the Annual Meeting of the Institute was loyally maintained and greatly strengthened.

Although death has thinned its ranks, there was a pleasing attendance of the Old Guard, and the discussions revealed that while able to command the latest information on mining matters, the Institute possesses members able to cite the struggles of the past, and to clarify present day problems by the wisdom that only experience can furnish.

The guests from sister societies, both in the United States and at home, were men of eminence, whose presence honoured the Institute, while their contributions to the discussions and social gatherings were cordial and in every way helpful.

The level of the topical discussions was up to the best traditions of the Institute, and it is doubtful whether at any time the members were privileged to hear a more authoritative consensus than the all too brief discussion upon the possibilities of the enlargement of the use of Canadian iron-ores and beneficiation processes. Operators, executives, research workers, pioneer iron ore miners and inventors gave their quota to the elucidation of an admittedly difficult problem, and those in Canada best qualified to express an opinion were joined by speakers of acknowledged eminence from the United States.

The meeting showed a disposition to look Canada's material supply problems in the face, as evidenced by the discussions on "blue sky laws", coal interchange and iron ore supply; and, if it should be suggested that no definite or satisfactory solution of the problems discussed was forthcoming it may be further remarked that no such result is to be expected overnight.

The retiring President and the newly elected President, the one in his valedictory and the other in his inaugural address, expressed a belief that the function of the Institute in regard to the general public was to educate and inform the public mind regarding our mineral problems, hoping thereby to ensure that future governments, which will be, as past governments have been, merely the reflex of public opinion, may adopt that understanding and fostering attitude towards the mineral industry which can only proceed from enlightened and sympathetic public opinion. Frank and sincere debating of our national problems serves no further purpose than to assure that correct [illegible] point among the Institute's own membership which is a result of analysis through discussion [illegible] gained. No difficulties are removed by avoidance. They must be faced and overcome, and the memories of the most recent gathering of the Institute [illegible] the primrose paths of optimism and must [illegible] space the narrow ways of the Hill Difficulty [illegible] at any rate that desire to be saved [illegible]

lieve the theologians, is a fundamentally necessary attitude.

It is not to be inferred from this Lenten attitude of the members that the Institute has suddenly adopted a self-castigating or ascetical policy, or that its feasts have become Barmecidian. In this respect the natural force of goodfellowship has suffered no abatement, and remains uniquely refulgent in that bright galaxy of sister societies which was toasted at the Annual Dinner.

MINERAL STATISTICS.

An objection which was not brought out in the discussion at Montreal relating to the transfer of the statistical work of the Department of Mines at Ottawa to the Dominion Statistics Bureau, is that the Order-in-Council by which this change is authorised over-rides the Act of Parliament by which the Department of Mines was created, and its duties specified, in 1907. Reference to this journal, in the issue of 16th April last, will possibly refresh the memory of our readers as to the original motive which impelled the Government — acting upon the advice of the Canadian Mining Institute — to create the Department of Mines. The question of mineral statistics was always prominently before the mining profession, and reference to the issue named will further disclose that as far back as 1886 the memorial presented to the Government pressing for a "Bureau of Mining and Mineralogy" confined itself entirely to the question of the desirability of compiling and disseminating accurate and accessible statistics regarding the mining industry.

Again in 1900, the memorial of the Canadian Mining Institute contained this reference to statistics, to wit:

"Statistical work is rendered necessary by the dif-
" ferent ways and units employed at present by the
" different provinces of the Dominion, and by the fact
" that existing statistics from any department of the
" Government are not inclusive of all the information
" that is available on any one material or subject."

The Act constituting the Mines Branch said; so far as statistics are in question, — "The functions of the Mines Branch shall be (a) to collect and publish full statistics of the mineral production and of the mining and metallurgical industries of Canada, and such data regarding the economic minerals of Canada as relate to the process and activities connected with their utilization, and to collect and preserve all available records of mines and mining works in Canada."

A little consideration of this carefully-worded clause, and of the wording of the Institute's memorial in 1900, and to go further back, of the wording of the memorial of 1886; will disclose a lucid and coherent idea running all the way through, and closely adhered to, which we believe to be as follows. That for the proper understanding and utilisation of our mineral resources statistics are essential, but they are not an end in themselves, being merely auxiliary to the administrative work of the Mines Branch in the same way that costs-sheets and other statistical information is required by the industrial manager and executive. It is furthermore all along recognised that — as in the parallel case of the industrial administrator — the form of the statistics and their nature must conform to the requirements and be suited to the needs of the administrative branch. To quote what is probably an extreme analogy, but not we believe an irrelevant one, it would be just as proper for the Dominion Statistics Bureau to take over the statistical work of the Auditor-General as to take over that of the Dominion Mines Branch.

In face of the specific wording of the Mines Branch Act, and of the equally definite request of the mining and metallurgical industries, which has not varied in thirty-five years, the suspension of this Act of Parliament by an Order-in-Council, without any consultation with the representatives of the industry, amounts to a flouting of the industry, probably not in the least intentional, but arising, as do so many other anomalies, from a plain inability to get the miners' viewpoint.

If there is any one thing that the Mines Branch has done well — superlatively well in fact — it is the collection and arrangement of mineral statistics, and we deny the possibility of dissent from this statement.

Furthermore, if the Mines Branch is to continue to perform its functions, it must continue to compile statistics for its own use, or how otherwise can it "collect and preserve all available records of mines and mining works in Canada"? This will necessarily mean that two departments of the Government at Ottawa will be engaged in the same occupation, and it is quite possible, indeed probable, that the two sets of figures will not jibe because they will be conceived from differing angles of view.

We believe the change contemplated is in every way inadvisable and unfortunate, and that if it is persisted in, it will only be temporarily, because the fundamental principle involved will in time be made quite clear, and that part of the administrative duties of the Mines Branch included under the rather misleading general term of "statistics" will be returned to it, as will other phases of departmental administration which in recent years have been divorced from their proper setting.

Apart from these considerations, however, we consider the chief objection to the change proposed is the arbitrary over-riding of a statute by an Order-in-Council, where the benefits supposed to be derived from the change are after all only a matter of personal opinion, and are not admitted by the industry chiefly concerned.

PERSONAL

Mr. W. A. Carlyle, Managing Director of the British American Nickel Corporation, is leaving for England during the week ending the 12th March, where, after taking a holiday on the Continent, he will resume consulting practice in London. Mr. Carlyle's departure from Canada will be very generally regretted.

Twenty-Third Annual General Meeting of the Canadian Institute of Mining and Metallurgy

Montreal, March 2nd to 4th 1921

(Reported by the Editor)

A Historical Meeting.

The 1921 Annual Meeting of the Institute was planned under difficulties because of the necessity at quick notice to abandon the plans for the Ottawa gathering that had been so nearly completed by the members of the Ottawa Branch.

There was general regret at the disappointment of the Ottawa Branch, who loyally and numerously attended the Montreal Meeting, accompanied by a looking forward to next year's gathering.

The Montreal Meeting was not marked by that recognition from the Corporation of the City or the Provincial Government that was a feature of the three most recent gatherings of the Institute; and, for some occult reason, the national status of the Institute is not so fully accorded to its gatherings in Montreal as is the case in other metropolitan cities in Canada. The absence of any important mining industry in the close vicinity of Montreal, and less obvious dependence upon the disbursal of wealth won from the mines, may account for the small bulk that the industry presents on the financial horizon of Montreal and the scant space that is devoted to it in the annual reviews of the large financial institutions of this great manufacturing centre. These observations do not, however, apply to the metallurgical industries, of which Montreal is now the most important centre in Canada, as the members were in part able to observe.

The new Secretary, Mr. G. C. MacKenzie, had an unusually hard task because of his recent induction to office and the change in plans; but, ably assisted by Mr. R. R. Rose, he is able to look back with much satisfaction upon a meeting that can properly be termed historical, for reasons that are elsewhere in this issue set forth.

Mr. C. V. Corless, President, 1921-1922.

Mr. G. C. Mackenzie, Sec.-Treasurer.

OPENING SESSION, WEDNESDAY, MARCH 2nd.

Presidential Address.

Mr. O. E. S. Whiteside, the Retiring President, read the address, which is printed on page 194.

Mineral Statistics.

Mr. John McLeish, Chief of the Division of Mineral Resources, Ottawa, read, according to time-honored precedent, the salient features of the Preliminary Report of Mineral Production for 1920.

Some new records were established, among them that of the highest total value of mineral production ever attained in any year in Canada. See the following tabular comparisons:—

	Value of Annual Mineral Production
1920	$217,775,080
1919	176,686,390
1918	211,301,897
1913	145,634,812

Mr. McLeish pointed out that selling prices had increased so greatly that values were not a safe guide to actual increase of production, but nevertheless there were a number of important increases in tonnage production during 1920, including the items of coal, copper, gold, nickel, zinc, asbestos, magnesite, mica, quartz, salt, cement and all structural materials. Particular attention was directed to increase of non-metallic minerals in Canada during 1920, which Mr. McLeish said gave evidence of "remarkable growth and development."

Mr. R. R. Rose, Assistant-Secretary.

The coal output, which represents 35½ per cent of the mineral output value of 1920, bulks very largely—partly because of the increased selling price of coal—but also because of an actual increase of 21½ per cent in production over 1919. Coal production in 1920 exceeded that of any previous year.

Mr. McLeish's Valedictory.

There was evidence of widespread regret, and dissent from the necessity or wisdom of such a course, when Mr. McLeish announced that this was the last occasion on which he expected to read the Preliminary Report. Owing its origin to the influence of the Institute, the Department of Mines had for 35 years — since 1886 — been in charge of the collection and arrangement of mineral statistics, and the members of the Institute had been uninterruptedly privileged to hear the annual statistics for Canada at the annual meetings in advance of general publication. The work had now been transferred to the Dominion Bureau of Statistics, in furtherance of the idea of centralization of statistics. Mr. McLeish expressed on behalf of the Department of Mines appreciation of the loyal manner in which—without legal compulsion—the mining industry had furnished the statistics of production and use that were necessary to his work of compilation, and asked that equally full support should be given to the new administration.

Dr W. G. Miller said the Department of Mines had collected and published mineral statistics so intelligently and accurately that he though it should be allowed to continue the work. The collection of mineral statistics in the greatest mining country in the world was delegated to the United States Geological Survey, and he considered that mineral statistics should be handled by mining men.

F. W. Gray emphasisied the need for continuity in arrangement of statistics, as in this, so far as comparison is concerned, their whole value consists. Mr. McLeish's tabulations had been used by the mining industry for years, and any alteration of their methodical arrangement would remove a landmark and destroy their usefulness to the profession.

T. C. Denis said it was desirable that the mineral statistics of the Dominion and the provinces should as far as possible be reduced to a common denominator, and in the past the provincial mine bureaus had worked in co-operation with the Department of Mines. The same co-operation might not prove possible under new administration.

Mr. T. W. Gibson took the opportunity to express his personal regret that Mr. McLeish's remarks were in the nature of a valedictory. Year by year it had been his pleasure and that of the members to listen to the Mr. McLeish's intelligent and lucid handling of the annual statistics. He knew that the new Statistician was endeavoring to set up a system of co-operation with the provinces, and so far as Ontario was concerned his efforts would receive sympathetic attention. Mr. Gibson said he had been in communication with Mr. Coats and his assistants for some time, but was not very hopeful that a practical system of co-operation could be worked out because of a viewpoint that differed greatly from that of the provincial bureaus. The amount of detail required by the Dominion Bureau was quite beyond what he regarded as the useful function of a provincial department of mines. For his part he desired to reduce the number of returns from mining companies to a minimum. If one set of returns would have answered all requirements Mr. Gibson said he would have been heartily in favour of adopting the forms, but he regretted to say that, so far, progress had not been marked, and he was a little doubtful of the outcome.

Mr. McLeish said the change had resulted from a desire for centralization, but he denied the merit of intensive centralization of statistics. He believed it was the intention to employ technical men, but he suggested that statistics were compiled for a purpose, and all phases of mineral resources should be gathered together. The idea of the government seemed rather to be that of getting away from the subject and devoting attention to a phase. At the time the Commission of Conservation was formed it was regarded by some as an error of judgment, for this reason; and, apparently, judging from the recent Speech from the Throne, there was an intention to return the work of the Commission to the several departments from which it had been gathered. Similar comment was

possible in regard to the Research Council. Research is not something that should be set aside. It is a part and parcel of administrative work. The idea of specializing on phases of departmental administration might lead to some palpably absurd arrangements.

Elaborating a former motion moved by Dr. W. G. Miller and seconded by Mr. J. W. Evans, a resolution was unanimously passed, moved by Mr. James McEvoy and seconded by Mr. C. V. Corless, asking that the contemplated Bureau of Statistics "shall not only supply the mineral industry with statistical reports as complete as supplied by the Department of Mines, but should also co-operate with the Provincial Bureaus to the fullest extent, and with the same sympathetic attention that has characterised the Department of Mines."

Mineral Production in Ontario.

Mr. T. W. Gibson, the Deputy Minister of Mines of Ontario, presented the figures of mineral production in that province for 1920, for compilation of which he stated that Mr. W. R. Rogers, the Statistician of the Bureau, was chiefly responsible.

The course of the mineral industry for the past decade has been as follows:

Value of Mineral Production—Ontario.

Year	Metallic	Non-Metallic	Total
1911	$29,102,867	$12,873,930	$41,976,797
1912	34,799,743	13,541,869	48,341,612
1913	37,507,935	15,724,376	53,232,311
1914	33,345,291	12,950,668	46,295,959
1915	44,109,679	10,136,000	54,245,679
1916	55,002,918	10,300,904	65,303,822
1917	56,831,857	15,261,975	72,093,832
1918	66,178,059	14,130,913	80,308,972
1919	41,590,759	17,293,157	58,883,916
1920	46,228,827	22,227,954	68,456,781

In regard to nickel, Mr. Gibson said that while the production might possibly never again in our time revert to the extraordinary output of war days, the pre-war production should be again reached and perhaps exceeded.

The output of silver continued to decline, but high prices had kept up the value. Silver would be mined for many years to come at Cobalt, but if the cost of production exceeded the market price, production would necessarily suffer. Mr. Gibson referred to the unpredictable character of the future of the silver market, reflecting as it did the mentality of the Orient, where centuries of oppression had made people desire to possess their wealth in portable form.

As to gold, this was the bright spot in the mineral industry of Ontario. The production had gone up, and although gold had a fixed price, he thought the extra remittances which came to Canadian producers through the premium of United States funds should properly be included in the table of values. The Porcupine Camp was a firmly established one, and Kirkland Lake was rapidly coming into prominence. One mine in this district had been recovering $25 ore for years. There was not part of the North American continent where gold mining had a brighter outlook than in Northern Ontario, and he did not think the industry was more than at the beginning of its importance.

Mr. Gibson referred to the failing supply of natural gas in Ontario, and the financial disabilities this had put upon the gas companies who were in many instances tied by rigid municipal contracts that imposed impossible financial burdens. He suggested that legislative relief from this difficult condition would be found necessary.

Mineral Production of Quebec.

Mr. T. C. Denis, Superintendent of Mines for Quebec, prefaced his remarks by regret that the Dominion Department of Mines was being relieved of its duties of collecting the statistics of the industry to whose interests it was devoted. The collection of mineral statistics had as its object not the mere compilation of figures, but was designed to feel the pulse of the industry.

Mr. Denis once again had the pleasure of announcing Quebec's uninterrupted upward climb as a min-

Mr. Geo. D. Macdougall, Vice-President, Mining Society of Nova Scotia.

eral producing province. The figures of mineral value following are self-explanatory:

	Value of Quebec Mineral Production $
1915	11,165,873
1916	13,287,021
1917	16,189,179
1918	18,572,595
1919	20,813,670
1920	28,223,141

Asbestos production reached 177,605 tons, valued at $14,674,572, the highest figures ever recorded, both as they relate to quantity and value, being an increase of thirty per cent in tonnage and thirty four per cent in value.

Mr. Denis pointed out that Quebec's mineral output being so largely non-metallic, had not suffered from the general collapse of the metal markets, and was benefitting from the return to peace time demand for

the structural materials which Quebec so largely provides. Further reference to the detailed figures will be made in later issues of the "Journal".

Prof. Dresser asked Mr. Denis if he had any official knowledge of the recent newspaper reports that the Province of Quebec contemplated placing restrictions on asbestos exports and mining leases intended to stimulate the fabrication of finished asbestos products in the Province.

Mr. Denis said he had not, but believed the newspapers in question were indication of a continuation of a campaign begun some years ago by the Eastern Townships Associated Boards of Trade. Ninety per cent of the asbestos mined in the Province was exported in the raw state, and processes of manufacture raised the value of the exported asbestos from $14,000,000 to possibly $100,000,000.

Alberta Coal Production.

In the absence of any official representative of the Alberta Department of Mines, the President stated that 1920 coal production had almost reached seven million short tons. The increase in the production, and the local absorption of domestic coal, were the striking features of the year.

From information received from Mr. Jas. A. Richards, the Inspector of Mines, it is possible to state that 1920 Alberta coal production totalled 6,908,507 tons, made up of 3,358,992 tons of domestic coal, 3,418,921 tons of bituminous coal and 130,594 tons of anthracitic coal. Comparison with previous year is as follows:

	Alberta Coal Production (short tons)
1918	6,148,620
1919	5,022,412
1920	6,908,507

Afternoon Session, March 2nd.

With Dr. F. D. Adams in the Chair, the afternoon was devoted to general business. This included a discussion of the proposed amendments to the By-Laws to provide for the appointment of an Executive Committee, a matter that will be later referred to the members to be dealt with by letter ballot. The necessity for a readily available Executive Committee, comparable to the usual provision in incorporated companies, was generally admitted. Two of the members were appointed to assess the opinion of the meeting for presentation to the members by the letter-ballot process referred to.

The Report of the Publication Committee was presented, and referred back to the Committee with authority to act.

On the matter of Engineering Legislation there was nothing said.

A request from Dr. R. C. Wallace asking for a motion defining the statutory business of the Annual Western Meeting, and referring to time and place of meeting, was referred to the Council.

The Secretary's Report.

The Secretary introduced a new feature by showing a series of graphic charts illustrating the attendance of Council Members at Council Meetings, a comparison of the growth of the Institute with that of the American Institute of Mining Engineers, the Institue's budget, and a curve showing how the members paid their dues, and how some did not.

Standardization of Breathing Apparatus.

F. W. Gray reported for a Committee which was appointed at the Winnipeg Meeting to make a recommendation for standardization of oxygen breathing apparatus, made by the Minister of Mines for British Columbia. The Committee, which was composed of Robert Strachan, Senior Inspector of Mines for British Columbia, Duncan MacDonald, Superintendent of the Mine Rescue Stations of the Alberta Government, and F. W. Gray, strongly recommended standardization both of apparatus and of training, and suggested that the Institute should request the Dominion Government to actively co-operate with the provincial governments in coal mining provinces to this end. No discussion took place, and no action was taken by the meeting, so presumably the recommendation will be dealt with by Council.

Evening Session, March 2nd.

The evening meeting was very well attended, with Mr. Balmer Neilly in the Chair.

Mr. F. E. Lathe (of the British American Nickel Corporation) read a comprehensive paper on "Principles of Copper Leaching and Precipitation". The paper covered methods of grinding and roasting, comparisons of solvents in present use, principles of solutions circulation, and the choice of anodes. Fused magnetite and ferro-silicon anodes have been found suitable for some South American plants. Mr. Lathe referred particularly to the difficulties arising from ferric iron, and with the current densities in the electrolytic deposition stage.

Mr. E. P. Mathewson said that current densities should be increased, and ferric salts should not be allowed to accumulate to the detriment of electrolytic deposition. Greenawalt's experiments indicated that he was on the right track, and promised a much wider application of leaching processes.

Mr. Carlyle referred to experiences at a leaching plant in Russia, where scrap iron was scarce. Granulated pig-iron from a pig-iron furnace was used, and was an ideal thing to handle.

Dr. Stanfield referred to the process of reduction of iron ores by gases, resulting in the formation of a fine metallic powder, which was a particularly suitable medium for copper precipitation from solutions. Mr. Lathe said sponge-iron had been used at Anaconda by Mr. Mathewson, who explained that while it formed an ideal precipitant, it cost too much to produce and scrap-iron had been reverted to.

Mr. P. E. Hopkins had been listed to read a paper on "Characteristics of Ontario Gold Deposits", but owing to ill-health was unable to be present, to the very general regret of the gathering, which would have welcomed the latest information on a goldfield that is daily assuming greater economic importance.

Public Treatment Mills.

Mr. W. E. Simpson, of the Miller-Independence Mine, read a lively paper on "Suggestions for the Better Development of the Mineral Resources of Northern Ontario". The necessity to return to a gold standard, said Mr. Simpson, was admitted, and Northern Ontario was the one place where increased gold production was quickly possible. He referred to the large extent of reputedly valuable gold areas where no work was being done, to other areas where one lone producer was operating, and to the fact that gold was being produced in quantity in two townships only. The evolution of most goldfields had seen leasehold titles,

that enforced operation, substituted for freehold titles. In Western Australia a title was forfeitable if three days suspension of operations took place, with a natural consequence that capital had been discouraged in that field. In Northern Ontario production could stand acceleration, and the extent of land being withheld from production is gradually increasing. The five cent acreage tax was more of an irritant than a source of revenue to the State.

Mr. Simpson advocated as a partial remedy the provision of public treatment-plants, or government-owned custom-mills.

Transportation played such an important part in Northern Ontario mining that Mr. Simpson estimated ten per cent must be added to mining costs for every mile that a mine was distant from a railway. He advocated the use of horse-tramways, built from local timber, and showed photographs of a rough-and-ready, but eminently practicable tramway of this nature that he had constructed. It was locally designated the "Muskeg Express".

Mr. T. W. Gibson defended the freehold system of tenure. Capital did not ask for anything so insistently as it did for secure tenure, and he instanced the United States as a great mining country where freehold tenure had been the uninterrupted custom. The five-cent acreage tax had resulted in returning to the Province hundreds of thousands of acres. No state could insist on every piece of land being developed. Passing a law requiring every man to develop his property would not improve matters.

Where there was ore present in sufficient quantity Mr. Gibson thought the idea of small stamp-mills was not a bad one. As to transportation, Northern Ontario was unusually well supplied with railways, and the influence of railways upon the opening-up of Northern Ontario mining districts was well known. There were districts now making valid claims for railways, and these claims would no doubt be attended to in due course.

Prof. Dresser said one difficulty in providing state-owned small stamp-mills would be to decide where they should go and how long they should remain. Where desultory prospecting had not proved successful, and reports of a glowing character come from a district, not better, but further away, the first prospected district is abandoned. A mill might strengthen the confidence of the prospector and lead to more intensive prospecting of the first-named district.

Mr. A. A. Cole said that from his experience with a small sampling plant he would judge there was need for just such mills as mentioned by Mr. Simpson. The Cobalt plant had received calls from as far as Port Arthur.

The question of power was an important one. The wood on a forty acre claim is not sufficient to bring that claim to a developed stage if used as fuel. The availability of electric power was of immense advantage. In the district north of Cobalt ten years ago there were two school teachers. Now there are ninety five, and fourteen new schools have been built in that district. These figures show that the country is growing.

Mr. C. V. Corless said he thought the Government would not be misled if it took Mr. Cole's advice as to locations where small stamp-mills could be usefully installed.

The evening closed with moving pictures of the operations of the Mond Nickel Company.

Thursday Morning's Session.

Under the Chairmanship of Capt. J. G. Ross, the meeting heard Mr. G. C. Mackenzie's paper on "Institute Service—Some Suggestions" the text of which appeared in the February Bulletin.

A good discussion followed Mr. Mackenzie's paper, which the President suggested could be profitably continued by letters to the Bulletin.

The question of membership by mining companies was debated, and there seemed to be a general disposition to deprecate financial contributions from companies to the extent that would restrict the independence of the Institute as the representative voice of the industry.

Remarks by the President of the A. I. M. & M. E.

Mr. Edwin Ludlow, President of the American Institute of Mining and Metallurgical Engineers, said that body was solely a technical society, but the Mining Congress was quite otherwise, being supported by the mining companies on a tonnage basis of financial assessment. The Mining Congress was primarily a political body intended to influence legislation. The A. I. M. & M. E. was trying to decentralize its branch activities, and the branches were helped by the local mining companies. Mr. Ludlow also referred to the Federated Council of Engineers, which has a membership of one hundred thousand. Mr. Ludlow did not know whether a Mining Congress upon the lines of the United States body would be found useful in Canada, but it had been distinctly useful on the other side. Its success was due largely to the personal ability of the Secretary, Mr. Galbraith, whose services were now regularly used for consultation by legislators where his special knowledge indicated the desirability. The Mining Congress was doing work that the mining engineers felt was entirely out of their line, and which they did not feel was part of the functions of a technical society.

"Blue-Sky" Legislation.

Mr. J. P. MacGregor, of Toronto, read a paper on "Blue-Sky Laws as they Affect the Mining Industry," and displayed before the meeting a typical promotion advertisement that had appeared in a Toronto newspaper.

Mr. MacGregor's address was an analytical treat, abounding in arresting epigrams, but based on very sound fundamentals. He said that all professional work sooner or later developed into executive tasks, and this principle was not confined to any branch of human endeavour but was common to all. He referred to the conditions of India and China previously mentioned by Mr. Gibson when speaking of the silver market—as arising from a lack of confidence in the government, originating from centuries of oppression and rapine, and constituting a society marked by the absence of capital, as we know it. Capital, in its essence, submitted the speaker, was confidence, and it was the Institute's duty to protect this confidence. The intent of the legislation proposed was not to deter men from taking a chance, but to see that the dice were not loaded. Prevention of the opportunity for offence was desired. Fraud, he admitted, was not definable by statute, but it was submitted that intelligence could detect fraud. The power that grants a charter of incorporation should continue its powers to prevent that charter being used as a means to fraud. The State should surely control its creature. The legislation proposed that no corporation should issue stock without disclosure of the relevant facts. Such legislation should pay its own way, in support of which Mr. McGregor

adduced interesting figures regarding similar legislation in Minnesota, where the preliminary test had in one year eliminated applicants for incorporation proposing to issue $150,000,000 worth of palpably fraudulent issues, or one-half of the total stock issues applied for in that year.

Mr. MacGregor believed that if the fundamental principles were held in mind a law of the simplest draftmanship would achieve the desired end.

Mr. MacGregor pleaded for a revision of popular opinion regarding law and lawyers. He said that we had so long been accustomed to righteous laws and equity in our courts that it had been assumed we were entitled to such equity, as much as a man is entitled to fresh air, but recent world events had shown that such was not the case. Law advanced as did the other arts of progress, and he instanced that the old law of partnership had been superseded by company law because its procedure was defined.

Mr. MacGregor said he was so convinced that the legislation proposed in Ontario was so clearly in the interest of the Institute, and so definitely within the scope of its duties that he moved the following Resolution:—

"That this meeting of the Institue do approve of the "principles of legislation commonly known as 'Blue "Sky Law' as being of help to the conservation of "Capital and for the prevention of fraud, imposition "and unfairness in the sale of securities and that it is "in the best interest of the mining and metallurgical "industries of Canada that legislation of this character "should be enacted in all provinces of Canada, where "such securities are offered for sale."

An animated discussion followed Mr. MacGregor's paper, which space will not permit of quoting verbatim.

Messrs. Gibson, McEvoy, Hore, Dr. C. K. Lane, Cohen, Godson, Schorman and Dowling took part. The application of the old proverb of *caveat emptor*, and the impossibility of parting a fool from his folly were spoken of. The consensus appeared to be that the legislation was more to be desired for the protection of the industry from imputations against its repute than for the protection of the "sucker," and after adding the words, "as outlined in the paper presented" (on the suggestion of Mr. Gibson) the resolution was passed without dissent.

Dr. C. K. Lane mentioned that some "wild-cat" work had incidentally benefitted the general fund of geological and other knowledge.

The paper on the Silver-Lead Deposits of the Mayo District, Yukon, by Dr. W. E. Coekfield, was read by title.

The meeting adjourned for a social luncheon, at which no speeches were made.

Thursday Afternoon's Session.

Mr. F. W. Gray synopsised a paper on "Canada's Coal Problem" which appeared in the February Bulletin, and was a continuation of the paper on the same subject read at Toronto last March, and of a paper dealing with the importance of the Western Coalfields read at Winnipeg in October.

The Radius of Transportation of Western Coals.

Mr. James McEvoy made a notable contribution to the elucidation of this problem by dealing with the radius of transportation of western coals as dictated by their economic worth at the point of destination. The problem of the use of western coal being so largely one of transportation costs, Mr. McEvoy, analysed the ability of the several grades to stand these costs applied upon their pitmouth costs.

He divided the western coals into the following divisions, and gave a figure representative of their relative heating value:—

	Figure Representing the Relative Heating Value
a. High-grade bituminous from Kootenay..	9
b. Sub-bituminous from Belly River	6
c. Lower-grade bituminous from Edmonton..	4½

The difference in heating value did not correspond exactly with the b.t.u's.

By means of charts Mr. McEvoy showed the economically transportable distance of the three grades of coal, and arrived at some illuminating conclusions, showing, for example that a purchaser could afford to buy "A" grade and pay freight for a thousand miles, and still have the same value as if he bought "C" grade and received it at the same point free of freight charges. Put in another way, if "C" coal is hauled a thousand miles with profit, it should be possible to haul "B" coal 1,666 miles and "A" 3,000 miles.

Regarding the possibility of supplying Ontario with the higher grade coals—which are situated at the greatest distance from Ontario—Mr. McEvoy said it resolved itself into a question of freight rates, which are supposed to be based on cost. He thought it was not too much to hope that train operating costs could be reduced by one-half for this class of traffic if the following conditions were fulfilled: (a) Powerful locomotives; (b) Maximum trainloads; (c) Through trains. The consumer would have to do his part by ordering his coal at those seasons in which the railways could handle it.

Mr. W. E. Simpson asked why the paper had ignored the question of oil and oil-shales, but it was explained these matters had been dealt with in previous papers, and were not properly included in a discussion of the coal-supply problem.

The President mentioned the recent widening of the distribution radius of western coal and commended the co-operative attitude of the people of Winnipeg who he said were more active in the campaign to use domestic-mined coal than even the coal operators themselves.

Mr. D. B. Dowling mentioned that the pressure for a deep waterway from the Atlantic to the Great Lakes had originated from the wheat growers of the West, and that the question was now before the International Waterways Commission. If the channel is enlarged not only will the western wheat come down to the sea by water, but the return cargoes could be coal from Nova Scotia.

Mr. Walter Herd, Mining Engineer of the Dominion Steel Corporation, by letter, confirmed Mr. McEvoy's point about the transportation of western coals, and stated that lignites and sub-bituminous coals could not compete economically with good bituminous coal, even if this had to be transported many hundred miles further.

The production of Nova Scotian coal might be increased to ten million tons annually as suggested by Mr. Gray, but it is questionable if it is desirable. Nova Scotia coal deposits are limited insofar as cheap production of the better quality coals is concerned, and an annual increase to the figure named would deplete the resources to such an extent that cost of production would materially increase in the not distant future. It would also deplete the metallurgical coal resources to an unjustifiable extent, and by the more intensive simultaneous working of superimposed seams, result in

considerable loss of coal in mining. Mr. Herd's remarks will appear in full in the Bulletin.

Dr. Lane emphasised the advantages that proceeded from seasonal freight-rates for coal designed to encourage transportation of coal in the seasons when it can be most economically handled. He considered interchange of coal products to be desirable, and spoke of the possibilities of Nova Scotia coal being sold in Boston.

The Search for Oil in the West.

Mr. J. Ness, of the Geological Department of the Imperial Oil Company, read a paper illustrated by lantern slides, on the "Search for Oil in the West," which, with Mr. Kindle's paper on the "Salient Features of the Geography and Geology of the Mackenzie River Oil Basin—also illustrated by slides—afforded the members an afternoon of rare enjoyment and profit.

The "Journal" hopes, by permission of the Institute, to reproduce Mr. Ness's paper with the photographs in full in a later issue. It was a moving tale of modern prospecting, of adventures by flood and stream, a real romance of applied science, and the applause which greeted the appearance on the screen of the oil, spraying upwards over the derrick, at the Fort Norman Well, indicated the appreciation of the gathering of the historical nature of this culmination of months of endeavour in a demonstration, ocular and incontrovertible, of the presence of petroleum in that far northern region.

Mr. Kindle's disclosure of the comparative mildness of the climate in the Mackenzie Basin, of the curving upwards of the isothermals and the timber line in this country, and the scenic landscapes he showed on the screen claimed the full attention of the audience. His pictures of the barren lands and the frontier of timber, and of native dwellings were equally enthralling.

Petroleum in the United States.

Following the two papers mentioned, Mr. W. A. P. Schorman, of the British-American Oil Company, showed a series of moving picture reels, prepared by the U. S. Bureau of Mines, showing the phases of the petroleum industry in the United States, from petroleum geology and search, to the great pipe-line systems of that country and the refining of petroleum into its products. As an example of the real educative value of the cinematograph, these pictures were revealing, as they enabled the mind to grasp the whole operations of the gigantic industry easily and without mental fatigue more completely than could have been achieved by much tiresome reading.

The Smoker.

With Col. J. J. Penhale presiding, the Smoker could not have been otherwise than a "howling" success, and it was.

The fun of the evening was a hilarious burlesque upon the granting of certificates to professional engineers on a fully agrarian basis. The osculatory benediction conferred by the Clerk of the Court upon Mr Denis was much admired, as was his graceful reception of this deserved favor. The orange-coloured transformation worn by the lady, toned exquisitely with the beard of the presiding officer. It was pretty good fooling, only it would be interesting to know if it was all fooling.

Friday Morning Session, March 4th.

In the absence of the author, Mr. A. W. MacDonald's paper on "Welfare Work" was read. This paper described the manner in which the related activities of the Dominion Steel Corporation's scattered collieries, iron-works, and ore and limestone mines, in so far as concerns all questions of employment, workmen's housing, and what is known as welfare work, had been placed under the general direction of a department of industrial relations.

Recreational facilities, employees' benefit societies, hospitals, children's playgrounds, sanitation, fire-prevention, first-aid work, housing, etc., were discussed in this paper. The object of the department is to reduce labour "turnover" to a minimum, to keep employees, once they are obtained, and to put them at the work they are most adapted for.

Mr. DeBlois of the Nichols Chemical Company emphasised the necessity to put a considerable portion of the responsibility for direction of such activities on the employees themselves, even to the extent of partial financial support, and the avoidance of any suspicion of paternalism.

Discussion on Increased Use of Canadian Iron Ores.

Mr. Cowie, of the Algoma Steel Corporation, opened the discussion by reading the brief presented by the Algoma Steel Corporation to the Tariff Committee of the Cabinet.

Since this statement has been presented, the Moose Mountain Iron Mine has closed down, and the Algoma Company would in all probability be compelled to close its ore mine. The situation was a most serious one. If we had in Canada, said Mr. Cowie, only one gold mine, one silver mine, one copper or one nickel mine producing, would we not all get together and try to keep them producing?

Mr. T. B. Caldwell — who received hearty applause upon rising — detailed his personal experience in the iron-ore mining industry in Canada. He had opened an iron mine at Wilbur, on the Kingston and Pembroke Ry. in 1880, and later had opened an iron deposit at Calabogie. Realizing that with the development of the great iron deposits of the Western States the Ontario deposits had become relatively small he had eventually become interested in the Temogami deposit, of the great value of which he was still convinced. He related the favorable opinion passed upon this deposit by the late Dr. Barlow and by Dr. Van Hise, the late O. LeRoy, and others.

There had been many discussions on bounties, but with such little result that he wished to suggest some other plan to interest the government. He suggested the Dominion Government should set aside a sum of money for the intensive testing and drilling of some promising iron-ore area. This he urged because he believed our iron ore resources were imperfectly known. Mr. Caldwell read a letter he proposed to address to the Government seeking an appropriation of $300,000 for studying the iron ore problem in Canada, and for drilling properties. He suggested that cost of drilling could be recouped from royalties imposed on iron ore shipped from the properties proved.

The Secretary said that for a long time he had earned his living by trying to make pig iron from Ontario iron ores, using magnetites from Calabogie and Central Ontario. Later on in Nova Scotia, he had used the local brown ore, and had attempted to use a highly siliceous magnetite of desperately poor quality in that Province.

As to bounties, he was absolutely sure the country

would never have been in a position to supply the iron and steel required for war purposes if it had not been for the initial assistance of the bounties. The system of bounties did most materially and efficaciously help our iron and steel industry. The matter had of course to be viewed from the national standpoint, but nevertheless he did not believe that at this time a request for a bounty would be favorably received. A deputation from British Columbia had visited the Government some years ago, but upon examination their representations were not found to be well founded, and it was no use making any proposition to the Government unless it was economically sound.

Most of our domestic ore supply is low-grade magnetite, high in sulphur, high in silica and sometimes high in phosphorous. It is not material favorably regarded by smeltermen. Beneficiation is therefore necessary. This means much planning and investigation, and much capital, and there must be a large tonnage of suitable ore in sight to justify this. Iron-ore deposits cannot be gauged as to quantity as one would gauge a silver or a gold occurrence. Beneficiated iron-ore provides a uniform and desirable product, but it is difficult to mix with other ores. Mixing is not attempted in the United States. An assured supply, sufficient to keep one or more furnaces working on beneficiated ore is necessary. The mistakes of the past should not be forgotten. An attempt has been made to beneficiate the Moose Mountain ore, but it had been an attempt to develop special machinery rather than a process. Other mines are closed down at present, including nickel and silver mines. The Government must be persuaded that the beneficiated ores would be used in Canada. They will not be interested in the export of beneficiated ores.

Mr. Caldwell's suggestion as to an appropriation is good.

Mr. B. Neilly said that the soundest opinion was that the iron and steel industry and national progress were directly related. There are Canadian ores that can be beneficiated, but not to meet American competition. How is the spread to be taken up? The discussion as to whether a bounty should be paid or whether an appropriation should be made he thought was immaterial, as it was the same thing. He mentioned that in the early history of the United States and of Britain also the importation or iron and steel goods had been prohibited in the interests of the home industry. He moved a resolution that:

> "Whereas the importance of the iron and steel industry is apparent, and only five percent of requirements is supplied from domestic iron ores, that this meeting go on record as advocating in principle the payment of a bounty on beneficiated iron-ores."

Mr. Goodwin said that so far we had attempted in Canada to smelt iron ores in furnaces of United States design, using United States practice, but our ores are dissimilar to those of the United States. Blast-furnace practice had been devised to suit local conditions in other countries. British furnaces are distinctive, and most radical departures from accepted practice have been carried out in Norway and Sweden. We should not assume that beneficiation is always necessary, but should suit our methods to our ores.

Electrical Smelting Progress.

Dr. Stansfield referred to his experiments in electrical smelting. There were two main difficulties in Canada, first, the supply of iron ore and secondly the supply of fuel. We had in Canada a considerable supply of electric power, and he had been experimenting for some years to devise a process to suit local conditions. It seemed now somewhat probable that the improvements which have been made in the reduction of iron-ore at temperatures lower than their melting point will bring the possibility of electric smelting into the region of practical operation. The process in general is to crush the ore, heating it, or mixing it with some form of carbon at temperatures about 800 degrees for hematite, or 900 degrees for magnetite, and making an iron sponge, which is the starting point for subsequent electrical furnace treatment. Dr. Stansfield said it seemed to him quite probable that before long

Mr. J. Stevenson Brown—One of the "Old Guard."

we should be able to reduce hematite ores so reasonably that their commercial utilisation will be possible. This would alter the complexion of the iron-ore situation in Canada, and the process might permit the utilization of low-grade fuels such as peat and wood.

Mr. Cowie said the increase in pig-iron production was a result of the bounties, and pointed out that the bounties paid by the Government during the bounty period was proved to have been returned by the increase in customs duties at the ports of Sydney, Sault Ste. Marie and Hamilton. Similar results might be expected to follow a bounty now.

Mr. Edwin Ludlow referred to a satisfactory grade of metallurgical coke which had been obtained from a mixture of the low-volatile coals from Jasper Park with the higher-volatile coal of Vancouver Island, at his suggestion. He mentioned that when looking over Vancouver he had noticed steel-ships building and was told the iron for their fabrication came all the way from Pittsburgh, which he hardly considered good business.

Colonel Dwight—whose connection with the Dwight-Lloyd process used at Babbit gave especial interest to his remarks—said that the problems confronting Canada in developing her natural resources were ones that appealed very strongly to confreres in the United States, as they were beginning to be troubled with similar problems.

Possibly all present were not aware that right alongside the development of iron ores in the Mesabi Range there had grown up a new enterprise for the beneficiation of taconite ores, which form an important part of the ore deposits of the Lake Region, and a problem that is now being attacked in a very serious way. Profiting by the experience in the low-grade porphry copper-ores, the Mesabi Company, financed by the well-known house of Hayden Stone & Co., who have had much experience and success, headed by Mr. Jackling, have undertaken to beneficiate these taconite deposits. They have gone at it intensively, have studied

Mr. H. Foster Bain, Director, U. S. Bureau of Mines.

the problem for several years and have tried many thousands of tests. After passing through all the different stages found to be necessary they are now proceeding with the construction of their first unit which will demonstrate on a fully-working scale the practical success of the enterprise.

Col Dwight gave a brief description of the process of beneficiation. Commencing with a crude agate ore containing 30 to 35 percent of iron, this is blasted out and gathered by steam shovels, crushed to a fine powder, concentrated in log-washers — modified by some electrical device that has been worked out, — de-watered, and passed over Oliver filters, after going through a Dorr classifier; is then mixed with the necessary amount of carbon and passed along to the sintering furnaces. The reaction was interestingly described by Colonel Dwight, who likened the process of the sintering to the burning of a cigar, the combustion proceeding from the top downwards and developing a temperature of from 1,000 to 1,200 degrees C., inducing a condition of semi-fluid mobility. The resulting sinter is not unlike coke, and in the case of magnetite is a material that responds very readily to the reducing action of the blast furnace.

In concluding, Colonel Dwight said that the application of this Mesabi development to Canad was *that if the other economic problems connected with the similar ores in Canada could be worked out, the beneficiation problem had already been solved.* He wished the Institute and the industry in Canada success in its endeavours.

Friday Afternoon.

In the concluding afternoon of the meeting, papers were read by R. L. Lindstrom on "Steel Castings for Mining Purposes" illustrated by lantern slides showing microphotographs bearing on the methods used to ensure sound castings for mining purposes and on annealing and heat-treating. Messrs. W. S. McKee and J. H. Blake presented a paper on "Manganese Steel Castings in the Mining Industry".

Excursions were made to the Davidson Steel Foundries at Turcot and to the works of the Dominion Engineering Works at Lachine. About 35 members accompanied these excursions.

At the Davidson works, the party was shown round by Mr. T. R. Davidson, General Manager, seeing the Snyder electric furnaces, the transformer-room, and the casting processes.

At Rockville, the newly equipped works of the Dominion engineering Works were seen, the party being shown through by the President, Mr. G. H. Duggan and his assistants. The Foundry and the Main Shop are not excelled in Canada. Castings of unusual size and fineness can be made, and the machine tools are of the largest dimensions. The manufacture of paper making machinery, and water-wheels, are this Company's especial work. Two water-wheel units, which were seen under construction in the shop, for the Cedar Rapids and Shawinigan Companies, are the largest of their kind yet constructed.

Non-Metallic Papers.

Papers were read during the afternoon with Mr. Denis in the Chair, on the asbestos industry by Capt. J. G. Ross, on Super Cements by G. M. Thomson, on Graphite, by V. L. Eardley Wilmot, Fluorspar by M. E. Wilson, and Mica by H. L. Forbes. Mr. J. Keele's paper on Brick and Clay was not read owing to his absence. Owing to the Editor accompanying the excursions a more detailed report cannot be given. Capt. Ross advocated an operators' organization to collate geological information, conduct an experimental mill, do research work in the interests of improvement in fibre recovery, and also give out some much needed information to the public of the progress of the industry. It may be noted here, in confirmation of Capt. Ross's views, that the asbestos industry is particularly suffering from the lack of general knowledge on the part of the public regarding the problems of the industry — much as the nickel industry suffered before operators took a thought and mended their public attitude — and much the same campaign seems likely to be waged against the asbestos producers, unless they enlighten the public as to the problems they face, as was waged against the nickel producers in Ontario.

The Annual Dinner.

This was held in the Montreal Club, a place that had pleasant memories to the Institute and has gathered some more. The President-Elect, Mr. C. V. Corless, was in the Chair, and at his table were seated Sir Arthur Currie; the President of the Engineering Institute of Canada, Mr. J. M. R. Fairbairn; Col. A. S. Dwight, President of the Federated Engineering Societies of the United States; Mr. H. Foster Bain, Director of the U. S. Bureau of Mines; the President of the A. I. M. & M. Engineers, Mr. Edwin Ludlow; the retiring President, Mr. Whiteside, Mr. A. P. Mathewson, Dr. W. G. Miller, Prof. A. A. Lane, of Cambridge, Mass., and Dr. F. D. Adams, of McGill University.

The Press.

Thanks are due to the Press of Montreal, both French and English papers, for the manner in which they reported the proceedings of the meeting.

The Presidential Address

Mr. O. E. S. Whiteside—Retiring President.

The Extension of the Institute's Activities.

In my address at the Annual Western Meeting in Winnipeg last Autumn I discussed the possible extension of the work of the Institute in the performance of what may perhaps be conveniently defined as social service; that is to say the sort of service that is designed not only to benefit the great industry that we specially represent, but through it the community as a whole. Let it not be forgotten, however, that this important function of ours has not been disregarded in the past, for the records of the Institute testify that so far as our capabilities admitted we have actively and effectively interested ourselves in public matters coming within our scope as a national mining body. That we should now seek to extend our activities, and thereby increase our usefulness in this direction is evidence of our virility. At least we have the satisfaction of knowing that the structure on which we may continue to build is a secure and firm one.

The Institute is the Voice of the Mining Industry.

The question is how shall we build? It seems to me to build effectively it is imperative that we continue strictly to maintain our representative character as an institution. We must speak and act not for any one class, not for capital, not for mine operators, not even for those who comprise the bulk and bulwark of our membership, the mining profession, but we must speak and act for the mining industry as a whole, and in our policies we must regard the mining industry not as an industry demanding or requiring special privileges or concessions, but in its relation to the commonweal. What we ask for in its name must be for the good of Canada, and by following that course at once disinterested and patriotic, shall we win respect and ready hearing, and set a needed example. For co-operation, which is the secret of accomplishment in human relationship, is only possible when selfish interests are forgotten or thrust aside in subservience to the common aim.

Bearing this always in mind we may next consider certain practical details and difficulties in connection with our programme. We have in Canada several countries in one; not one Government to deal with but many. The settled portion of this wide Dominion is confined within a comparatively narrow belt but stretches across the continent. Even in individual Provinces considerable distances separate mining camp from mining camp; and even in the same province interests are frequently diverse and may be conflicting These are some of the factors to be reckoned with, they complicate our problem. Furthermore, unlike Great Britain, and unlike even the United States, we have at present no opulent class of mining engineers, retired or semi-retired, able and willing to devote their leisure to altruistic work at the bidding of the technical societies with which they are associated we must perforce depend upon the gratuitous services of men usually occupying salaried positions, and engaged in work that makes insistent demand on their time and attention. That the Institute has never yet appealed in vain to its members for service is a matter for pride. The continued loyalty of the members of the Institute and their *esprit de corps* cannot be questioned. I conceive, however, that by means of special organization this spirit can be turned to even greater account than in the past. Our headquarters are in the East; but Montreal is a thousand miles distant from the great mining centres of Nova Scotia, and from two to three thousand miles distant from the Western centres of mining activity. It is more conveniently in touch with Ottawa, where legislation affecting mining in the Prairie provinces and the unorganized North-West Territories is enacted, and where under the auspices of the Department of Mines work in the interests of mining throughout the Dominion is initiated. That proximity is a decided advantage. But geographical conditions impose that our Headquarters, no matter where they are located, must necessarily be at a great distance from most of these localities in Canada in which mining is conducted. That is the disadvantage. Having regard to this it seems clear that special machinery is needed, or special provision should be made to enable the Institute to perform adequately its functions in the way of social service in those parts of Canada that are remote from headquarters.

Decentralization of Effort.

If as is considered so desirable and fitting, the Institute should stand in relation of adviser or counsellor to Government on all matters pertaining to mining, it seems almost necessary that for this work we should expand our system of Branch organizations to comprehend Provincial Divisions to which specific duties might be delegated; for it is manifestly impracticable, and not infrequently it would be impolitic, for Provincial Governments to be approached on strictly provincial issues in any other way than by a duly accredited body of members resident in that Province to the Government of which it was required to make representations. Safeguards naturally would be requisite against action not according with the general principles or policies of the Institute, but such restrictions should be readily definable. Already in the case of British Columbia, and, in effect, of that of Nova Scotia, we have precedent for the establishment of Provincial Divisions of the Institute. Such bodies acting in co-operation and concert with headquarters are capable, I believe, of affording a measure of service difficult of attainment by any other means. They alone could establish those intimate relations with their own Provincial Governments that is desired; the relation of counsellor, rather than that of critic, complainant, or

suppliant. In holding and stimulating locally the interest of members in the work of the Institute they would prove effective; and in assisting to forward the work initiated by Headquarters in connection with mining issues of Dominion-wide application they would be invaluable.

Co-operation with other Organizations.

In the prosecution of its duties having to do with the industrial side of mining and metallurgy, the Institute might well also go outside its own organization for assistance and support. Such bodies as the Manufacturers' Association and Boards of Trade might advantageously be invited to co-operate; and, as already suggested at Winnipeg, the powerful aid of the press should not be ignored.

The Problem of Coal Supply.

Of the great problems yet unsolved with which we in this country must deal, and deal adequately without delay, that of coal supply is the chief in the minds of many people. In the solution of this problem there is opportunity for the Institute to play a part. With the terms of the problem all here are doubtless familiar. Coal is the most essential of all raw materials. Upon its production in Canada in sufficient quantity to satisfy demand in Canada, depends in a very large measure our industrial independence and our national self-sufficiency. It is definitely known that our coal resources are greater than those of any other country save the United States only. But nature has played us a trick in distributing these resources unfairly, giving much to the extreme East, much more to the West, and none at all to the central, and, at present, the most thickly populated portion of our country. In consequence a very considerable proportion of the coal consumed in Canada—some twenty million tons or more annually—is derived from the coalfields of the United States, which by reason of their proximity have been able to supply coal to Central Canada at a lower price than that at which Canadian coal could be offered. No doubt no principle of political economy was violated by this arrangement. But first the War, with the fuel shortage incidental thereto in the United States, and, more recently, the fact that our balance of trade with our neighbour has been sadly on the wrong side, with a consequent penalization in the rate of exchange, has brought reflection that independence in the matter of fuel supply is very much in the national interest. I am convinced that that desideratum is in great part attainable. The problem, however, must be regarded as a national one, and must be so attacked. Its successful solution depends on the determination of all concerned to find it; and those concerned comprehensively includes the people of Canada. Whether the people of Canada as a whole realize as yet what a successful solution of the coal problem implied is open to question.

The Institute's Duty to Inform Public Opinion.

The task of moulding public opinion to a proper understanding and appreciation of this, to us, most vital of issues, is a task that the Institute might assume with the full assurance that it is one worthy of its highest endeavours.

GEOLOGICAL INVESTIGATIONS IN NEW BRUNSWICK AND NOVA SCOTIA.

(Part "F" Summary Report, C. G. S. 1919.)

Part F, Summary Report of 1919, Geological Survey, contains accounts of investigations carried on in New Brunswick and Nova Scotia by Messrs. W. J. Wright, E. R. Faribault, and A. O. Hayes.

Oil Shales.

Reconnaissance of the geology of the Moncton map area, and in King's County, New Brunswick, warrant certain corrections of the geological sheets, and indicate a much wider extension of the Windsor series than was supposed to exist.

The Albert series, the source of the oil and gas of the Stony Creek Field of New Brunswick, are estimated to contain at least sixty million tons of oil-shale. At Albert Mines, and at Rosevale, the quantities of oil-shale, in Mr. Wright's opinion, warrant the establishment of an oil-shale industry.

Investigations in Pictou County also indicate the existence of much oil-shale. In the vicinity of McLellan's Brook, Pictou County a number of seams of rich oil-shale are reported. If the yields reported to the Survey officers by owners of shale areas are correct, "this vicinity contains practically inexhaustible supplies of oil-shale well situated for development."

Gold Series.

Mr. Faribault reports on investigations in the Sable River map-area, Shelburne & Queen's Counties, the Carleton gold district, and the Kemptville gold district in Yarmouth County, and on a section of the upper part of the gold-bearing series at Cranberry Head, Yarmouth Co. All the gold mines in these districts are now idle. Mr. Faribault comments on the lamentable and desolate appearance of the de-forested and burnt-over areas of the interior of Nova Scotia, which because of climatic conditions, heavy precipitation and suitable soil offer possibilities for forest cultivation rarely met with elsewhere.

Salt and Coal Deposits.

A. O. Hayes reports on coal and salt occurrences in Nova Scotia, The Malagash deposit and the salt deposits of Nova Scotia and New Brunswick in general have been already made the subject of a memoir that has been previously noticed in the "Journal."

Particulars are given of borings for coal seams in the Ste. Rose and Chimney Corner areas of Inverness County. The analyses given in the Report show typical Inverness County coals, which are non-metallurgical in character, forming poor coke. They are, however, good domestic coals.

THE INCHCAPE BELL.

Lord Inchcape, the well known English banker, has some things to say about trade conditions in Britain that have an application not confined to the British Isles. Some of his statements are quoted:

"What killed the boom a year ago was that nobody, whether he was a manufacturer, or a customer, a Government, a private employer or a working man, seemed to bother about costs".

"Excessive profits snatched during a boom have always to be paid for later on. Excessive wages bring the penalty of unemployment"

"A maximum wage is never too much for a maximum output. But a maximum wage for a minimum output is fatal not only to the individual but to success as a nation"

"As a nation we have nothing to fear, industrially or politically, from any foreign rival. Our real dangers are internal."

THE HOWERY CREEK AREA. — A NEW GOLD DISTRICT.

By D. CUSHING, Sudbury

Northern Ontario has a new gold camp in the making, of which practically nothing is known as yet by the public, but which holds promise, that in a year's time, it may become quite a producer, and of more than one precious metal in paying quantities.

The camp in question is the Howery Creek area, which is located in the Sudbury Mining division. It is six mile from Willisville on the Algoma Eastern Railway, and 64 miles from Sudbury.

Gold was first discovered there in 1911 by James Bousquet. At that time the Porcupine camp was the centre of the mining interest, and outside of some assessment work, no attention was given to the new camp.

Today, however, it boasts of two excellent properties. The Howery Creek Mining Corporation and the Bousquet Gold Mines Ltd. Both are substantial concerns in good hands — people who are interested in real mining.

Compared with other camps. Howery Creek has features which may well be termed sensational, and they will be well within that category if the development of the ore bodies prove up to the showings of the systematic channel-sampling, which has been carried on. As an instance of this, figures given in a report on an assay of some ore from the Howery Creek property, made by T. J. Dee, Chicago, might be quoted. The Dee report showed the following mineral content:

Platinum, $18; Gold, $30; Silver, $4.50; Arsenic, 23.55 per cent.

These assays were from channel samples taken from the vein on the property, and show that there is sufficient mineral content of any one of three minerals to make the proposition a paying one, providing the ore body when developed comes up to the surfaces values.

A. L. Kemp, formerly of the Dome Mines, is the managing director of the Howery Creek Company. He took over the property, along with that now being operated by the Bousquet company, before the war and completed the assessment work on the whole. Mr. Kemp took up the property as a gold proposition, and the finding of the platinum and arsenic content were two subsequent and surprising features. The first of these came after the Ontario Government geologists had tipped him off to look for platinum. They stated that it might be found, owing to the fact that excellent platinum values had been secured at the Vermilion mine, situated some miles away and operated by the International Nickel Co. Mr. Kemp sent samples of his ore to Chicago and the assayers' report showed not only the platinum but the arsenic as well.

Even then Mr. Kemp did not realize the full purport of this as he lacked knowledge of the arsenic trade and did not appreciate its value. Some time later he was in Newark, N.J., and got in touch with a large dealer in arsenic there. He asked if there was a market for twelve tons of arsenic per day and was informed that arsenic was bringing 15c a pound and that the southern cotton fields provided a market for arsenic that it was impossible to supply with the present limited production.

It was on his return to the north that Mr. Kemp gathered together the fifteen channel samples and sent them to Chicago. The assays showed that fourteen of the samples contained platinum and the figures previously given are an average of all the fifteen samples.

Mr. Kemp also prepared a car of 108 tons taken from the vein on surface when test pits were sunk. This was shipped to the smelter and the return was $2.62 in silver and $29.35 in gold. He also took a car of 47.3 tons to the McIntyre at Porcupine and was paid $16.92 per ton for it.

"Arsenic is the thief of gold, I have learned that." said Mr. Kemp in discussing these shipments and outlining his plans.

Knowledge of this fact brought about a complete change in his mining plans. Instead of going in for gold mining, he will mine for arsenic, and the gold, silver and platinum content will be by-products, just as cobalt is a by-product of Cobalt Silver Camp, and copper is a by-product of Sudbury nickel mines.

At the time Mr. Kemp was speaking to your correspondent, he had in the C. P. R. yards, at Sudbury, a rotary-kiln roasting-plant, capable of handling fifty tons of ore a day. This he estimates will provide 12 tons of arsenic a day. He will first treat the crushed ore in the roasting plant to extract the arsenic and will then extract the precious metals by a cyanide system. He already has a complete camp erected with a 60 h.p. boiler and three drill compressor set up.

As for the geology, the predominating rocks are quartzite, greywacke, conglomerate and porphyries. The formation is said to be very similar to that of Kirkland Lake. This is more true of the Bousquet property than the Howery Creek. The latter is right on a Keewatin contact.

The Howery Creek Company has four claims in all, 163 acres. The vein has been stripped and trenched for 2,700 feet. It averages three to five feet wide. The vein passes over a hill and the development scheme calls for mining through a tunnel, driven into the side hill. The tunnel is now in 240 feet and is expected to stroke the ore body at 300 feet. It will then be 103 feet down from the surface.

The Bousquet property is right next to the Howery Creek and is the latest mining effort of Robert R. Tough, of Tough Oakes fame and who is also a leader in the Bidgood Gold Mines of Kirkland Lake. This company has six patented claims with a total acreage of 315.6 acres and several unpatented claims. The company is so far financed for the erection of camps, purchasing and installing the plant, etc., and sinking to 300 feet. The camps are now being erected. A plant is already on the way and consists of an 80 h.p. boiler and 5-drill compressor and 7 x 10 hoist. When the plant is ready, sinking will start immediately. The shaft, which will be a vertical one will be carried to the 300 foot level with a cross-cut at the 150 foot level. There is already a 40 foot incline shaft on the property which was put down for test purposes. The mineralized zone on the property is said to be 40 feet wide and has been traced for over a mile on surface. A series of open cuts at irregular intervals were made over a distance of approximately half a mile along this zone and channel samples are announced to have shown the following assays: 4 ft., $3.50; 12 ft., $5; 12 ft., $6.60; loft., $12.40; loft., $4.95; 3 ft., $20; 5ft., $13.

Harold Tough, son of R. R. Tough, is president of the company. It is capitalized at $2,000,000, with the par value of shares at $1. The company issued 275,000 shares to take care of development and this issue was taken up in Toronto. The Howery Creek is capitalized at $1,000,000 with its head office in Toronto.

SALE OPTION GIVEN FOR ATIKOKAN IRON MINE.

J. J. O'Connor, Port Arthur.

That the iron ore resources of Northern Ontario are about to receive the active attention of experienced iron-ore operators, was announced at the meeting of the Port Arthur City Council on the 1st instant.

Mr. J. Dix Fraser, representing the National Trust Company of Toronto, appeared before the City Council of Port Arthur, and asked for the ratification of an agreement, made by the National Trust Company, with Clement K. Quinn, of Duluth, Minn. at a meeting of the Council on the 1st inst.

Mr. Fraser asked for the ratification of an agreement made between the National Trust Company, and Mr. Clement K. Quinn, for the sale to the latter, of the properties of the Atikokan Iron Mine, situated on the Atikokan River, 127 miles west of Port Arthur, on the Canadian National Railway.

The City of Port Arthur has a one tenth interest in the mine and blast-furnace of the Atikokan Iron Company, the last-named being located at Port Arthur.

Mr Fraser stated to the City Council that the National Trust Company had granted to Mr. Quinn a ninety-day option to purchase the Atikokan Iron Mine, in order that he may make searches of title, and carry out preliminary work necessitated by the transaction. The agreement made between the National Trust Company and Mr. Quinn, was, necessarily made subject to ratification by the City of Port Arthur. The agreement was practically made complete, when the Council, by resolution, authorized the Mayor and City Clerk to "execute the request of the National Trust Company for the sale of the Atikokan Iron Mine."

Mr. Fraser stated to the City Council that the consideration was $1,500,000, payable $50,000 within one year and three months from the date of commencement of operations, and the balance of $1,450,000 in yearly payments of $100,000, the balance due bearing 6 per cent interest.

No intimation was given as to the probable date of commencement of active operations at the mine, as Mr Fraser stated he was not in possession of Mr. Quinn's proposed program, but, as Mr. Quinn has been given the right to carry on extensive operations at once, it is presumed that active mining will begin on the conclusion of the transaction, and that the Atikokan will enter the shipping class during the current year.

During the currency of the payments, mining is to be carried on subject to the approval of the National Trust Company's representative, Mr J Dix Fraser, who will act as an inspector. This is for the purpose of guarding against the possibility of taking out only the high grade ore, and abandoning the property at a later stage.

Mr Fraser also made the statement, that, while the furnace had been separated from the mine property, he had every prospect of a sale of that too, within a comparatively short time. He intimated that negotiations were well under way to that end, and would likely be successfully concluded.

Mr Quinn is one of the most enterprising and successful iron-ore operators on the Minnesota ranges with offices at Duluth, Cleveland, and on the various iron ranges of Lake Superior. His advent upon the mining activities on the iron-ore ranges of Northern Ontario is hailed with the greatest satisfaction. It is felt that his standing in the iron-ore world is a sufficient guarantee that mining and shipping of iron ore from Ontario ranges will soon be an actuality, and will lead to further, and more extensive operations on many of the iron ranges on the Canadian side of Lake Superior.

OBITUARY.

Charles E. Duncan, General Superintendent, Algoma Steel Company.

Mr. Charles E. Duncan, general superintendent of the Algoma Steel Corporation, Sault Ste. Marie, died at the General Hospital on February 26th, following an operation for appendicitis. His death, while not entirely unexpected, came as a shock to the wide circle of personal and business friends who held him in the highest esteem. His illness dated from the 19th.

Mr. Duncan was forty-eight years of age. He was an American citizen, born in Chattanooga, Tennessee, but he lived in Johnstown, Pa., most of his life, where he began to make steel as soon as he was old enough to work. He started on the Homstead Works of the Carnegie Steel Corporation, following in the same business as his father and working in every department of the steel and iron business, until he rose to be recognized as one of the best steel men in the country. At one time in his career, he was assistant general superintendent of the Bethlehem Steel Corporation, where he was personally highly regarded by Mr. Charles Schwab, the president of the company. Mr. Duncan knew the practical side of the steel making business as few men do. He commenced his work with the Algoma Steel Corporation of Sault Ste. Marie in 1909 and was general superintendent here until 1915, when he went to the Donner Steel Company of Buffalo, N.Y., and thence to the Pacific Coast Steel Company of San Francisco, where he was in the service of the United States government, which had taken over the plant. In April of 1920, when the late David Kyle died and Mr J D Jones, who at the time was general superintendent, was made general manager, Mr. Duncan was recalled and was engaged as general superintendent up to the time of his death.

The wide circle of friends who keenly regret Mr Duncan's loss, regarded him as a man of unusual capabilities. He was broad visioned and possessed an almost uncanny knowledge of steel. He was a man who could mix on intimate terms with both the most prominent executives in the business and the ordinary workers in the mill.

He was a well proportioned man, physically and mentally, and regarded with respect by every one who made his acquaintance. The officials of the Algoma Steel Corporation, especially, regret his decease, as he was an invaluable member of the executive staff.

He is survived by his wife, a son, Ellis of Johnstown Pa., his mother, two sisters and a brother, the four latter also of Johnstown. His father, J. M. Duncan, predeceased him by only three weeks.

Funeral arrangements were in the hands of the officials of the plant. Burial took place in Johnstown where the body, accompanied by officials of the Corporation, was shipped.

Northern Ontario Letter

THE SILVER MINES.

The Cobalt District.

Silver production of Ontario for 1920, coming almost entirely from Cobalt and Gowganda, amounted to 10,831,146 ozs., valued at $10,687,687, according to the preliminary estimates made by the Ontario Department of Mines. Added to this is a premium on exchange of upwards of 10 p.c. and which brought the total income to about $12,000,000.

During 1920, the Nipissing mine produced approximately one-third of the total silver output of Ontario, and easily held the leading place, this company alone accounting for 3,390,537 ounces.

The quotations for silver show a further weak tendency, and there is no very great encouragement for the closed-down properties to resume work this Spring. A decline in operating costs or an upward move in the price of silver will be necessary before any general resumption of work can take place.

The question of the possibility of a return to bimetallism is a live topic among certain mine operators. The chief contention in support of the scheme is declared to be that in a single stroke a great industry would be placed upon a stable basis, while at the same time the metallic value behind the great amount of paper currency would be greatly increased. The advocates of bimetallism declare this is one of the questions which Lloyd George discussed with Sir Auckland Geddes just prior the departure of the British Embassador for Washington. Whether the plan is feasible, or not, could possibly only be determined by international conference; but, should bimetallism be adopted it would stimulate silver production.

The Mining Corporation of Canada has officially announced its intention to immediately suspend producing operations because of the unprofitable selling price of silver. It is understood the Corporation intend to take the opportunity to improve and enlarge the treatment equipment in the hope of reducing unit costs. In carrying out this work it will be possible to find employment for at least a portion of the mine employees. In 1920, this Company produced 1,806,274 ozs. of silver, equivalent, plus exchange premium to a revenue of over two million dollars. The dividend for the first quarter of 1921 was passed.

Ore broken in the Hudson Bay Mines amounts to 3,000 tons instead of 300 tons as reported last week. The error occurred in transmission of the report. In addition to this, a further substantial tonnage is indicated, and milling will commence about May 1st. The ore contains an average of about 15 ounces of silver to the ton.

The O'Brien mine with 1, 179,706 ozs. was the third largest silver-producing mine in Canada during 1920. The physical condition of the property is not stated, for the reason that it is controlled by the M. J. O'Brien, Ltd., a private corporation which does not issue an annual statement.

A further wholesale surrender of Crown lands is threatened should a proposed amendment to the Ontario Mines Act be enacted. The amendment reduces the statutory work required to 200 days as compared with 240 days' formerly. Not only this, but whereas the old regulations have compelled claim-stakers to perform the first instalment of work within three months after staking, thus assuring activity the new regulation allows a full year within which to do the first instalment of work. This is likely to lead to a great amount of "blanketing, and the holding of large acreages by speculators which they may abandon at the end of a year if no sale is made. This is not good for the industry.

At the time of writing, it is not known whether the profit-tax on the mines is to go into force, or not. The bill was expected to come up this week for its second reading.

Government prospectors' classes opened in Haileybury on Tuesday, March 8th, under the direction of Prof. W. L. Goodwin. These classes will continue until March 18th, and are free of cost to all those who may be interested. The mining building of the Haileybury High School is being utilized.

Gowganda and Elk Lake.

Difficult transportation is reflected in the figures which show the output of silver from the Gowganda silver area during 1920. The Miller Lake-O'Brien produced 376,417 ozs. which plus the output from the Castle property of the Trethewey Company, brought the total up to about 450,000 ounces. In spite of the transportation handicap, however, a comparatively large amount of work will be carried on this year on properties near Miller Lake and Leroy Lake.

In connection with proposals for rail transportation to the Gowganda district, there is some dissatisfaction arising from a belief in some circles that this should come as a result of a line from Swastika, running in a westerly direction through Fort Matachewan, Gowganda and West Shiningtree. In other circles it is believed better to extend the Elk Lake branch of the T. & N. O. Ry. Those who have opposed the Swastika proposal are accused of knocking the mining industry. Likewise, a somewhat similar accusation has been directed against those who oppose the extension of the Elk Lake branch. The Associated Boards of Trade were asked to deal with the Swastika project, but decided to not pass favorably on the proposal. L. O. Hedlund, of Gowganda, writes to the "Journal" to say it was wrong to publish the statement that the Elk Lake Board of Trade passed a resolution in opposition to the Swastika-West Shiningtree proposal. However, such a resolution was passed, and was also endorsed by other Boards of Trade of the district, among them being the New Liskeard Board. In reviewing the prospective mineral resources through which a railway would pass, it is interesting to note H. C. Cooke, of the Geological Survey, Ottawa, recently practically condemned the area lying between Swastika and Fort Matachewan. From a mineral viewpoint the area is said to be of no economic value. On the other hand, the entire territory lying between Elk Lake and Gowganda, as well as Elk Lake and Fort Matachewan is of very considerable prospective merit. Not only this, but the cost of construction would be less than from Swastika, the distance being shorter. Your correspondent is endeavoring to assist the mining industry, including encouragement to provide transportation to Fort Matachewan, Gowganda, West Shiningtree, etc., and only seeks to gather information to show the manner in which this may be done to the greatest advantage. Discussion of the question will be welcomed.

Col. A. H. McKee, of Elk Lake, is mentioned as likely to be made a Commissioner of the T. & N. O. Ry. It is learned by the "Journal" that Premier Drury is favorably disposed towards this appointment. The choice is not definite at the time of writing, and the object of Premier Drury's mention of the matter is to bring forward expressions of opinion from the district.

One and Bullion Shipments.

During the week ended March 4th, the O'Brien was the only mine to ship ore from Cobalt, this company sending out one car containing 64,310 pounds.

During the corresponding period, the Nipissing made another heavy shipment of bullion, sending out 76 bars weighing 100,235 ounces. This makes a total of upwards of 400,000 ounces of bullion shipped by the Nipissing during the past two weeks.

THE GOLD MINES

The Porcupine District.

On Feb. 25th, the Hollinger Consolidated will disburse a dividend of 1 p.c. amounting to $246,000. This is the third disbursement to be made so far this year and is accepted as an indication that the company is definitely on a dividend-paying basis of 1 p.c. every four weeks, or at the rate of 13 p.c. annually.

Due to the remarkable progress being made in the Porcupine and Kirkland Lake gold areas, the output of gold from Ontario increased 11.7 per cent. over the record established during the preceding year. Ontario's share of the total output of the Dominion for 1920 amounted to 73.7 p.c. as compared with 65.9 p.c. during 1919. Not only this, but the general preparations now under way at the mines offer assurance that a further large gain will occur during the current year. It is believed this year's increase may reach upwards of 25 p.c., with the likelihood of further large growth during 1922.

During the last half of this year, the gold mines of Porcupine and Kirkland Lake are expected to be producing at the rate of close to three tons of gold bullion every thirty days, or something like $1,500,000 a month. All the mines are operating at the fullest capacity possible under the present hydro-electric power shortage, but this amounts to an average of about three-fifths capacity. The month of May is expected to witness all the leading mines working at full capacity.

The McIntyre-Porcupine is rushing plans to increase its milling capacity, and the outlook for this company is better than ever before in its history. Favorable developments along the two main ore-bodies at depth has offered every encouragement to speed up the installation of the new additions to the milling equipment, and an increase of fifty per cent in production is expected to be established as compared with the previous best record. This means that a big increase in the rate of dividend disbursements will probably be made, and a yield of 30 per cent on the company's issued capital is being estimated by careful observers.

Financial arrangements being made in connection with the Porcupine V. N. T. lead to the belief that the company will join the active operations within a very short time. The plan of work includes sinking the main shaft from its present depth of 600 feet to 900 or 1000 feet. Good ore occurs down to the present depth, with indications that ore-bodies increase in width and richness at greater depth is attained. The mill is designed to treat 100 tons of ore daily and can be increased to 150 tons daily by spending $50,000 on construction and remodelling.

Among the properties likely to be reopened this Spring is the Gold Reef where surface outcrops carry spectacular values in a comparatively narrow vein. Diamond drill tests have indicated a strong vein at depth. It is planned to sink a central shaft to a depth of 300 feet at which point lateral operations will be carried on.

As a part of the general preparations to operate at full capacity within the next month or sixty days, the Dome Mines has taken the added precaution to carry duplicate parts for its crushing equipment. Beginning with April, this enterprise promises to rise rapidly to a leading place among the great gold producers. In 1920, the mine produced $2,005,640. In doing this, a total of 295,220 tons of ore were treated, yielding an average of $6.80 per ton. In addition to this output, the company realized about 10 p.c. in exchange premium, which brought the total income to over $2,200,000 and the value to around $7.50 from each ton of ore treated.

Official announcement has been made to the "Journal" that the new mill on the Wright-Hargraves mine at Kirkland Lake will be started up about May 1st. It is not planned to operate the plant at full capacity during the first month or so, but to turn the equipment up gradually, accordingly as ore is drawn from the underground workings in cutting stopes and preparing ore chutes. The out look for this enterprise is exceedingly favorable.

High grade ore is reported to have been found in a 4-ft vein at the 700-ft level of the Kirkland Lake Gold Mines.

British Columbia Letter

Stewart B.C.

An active interest is being taken by the Alaskan authorities in the opening up of the Portland Canal District. C. W. Cheatham, superintendent for the Bureau of Public Roads in Alaska, in the course of a recent inspection of the work of the past season, stated that good progress had been made and that it was practically assured that a road would be constructed some distance up Fish Creek. This would provide for transportation for properties on the Alaskan side of the line. Work on a bridge across Salmon river at the mouth of Texas Creek has been suspended. The piers are in place and other material on the ground and as soon as the water begins to rise in the Spring the remainder of the work will be done. This will furnish an outlet for ore from a number of British Columbia properties. It also will give prospectors access to an immense unexplored area. Mr. Cheatham admits that much of the work being done will help the British Columbia camp but points out that the latter was the first to start and that it has directed attention to the mineral possibilities of that section of Alaska.

Hazelton B.C.

C. A. Bjornstad, of Walhalla N. D., vice president of the Kleanza Company, of Usk B.C., which is interested in mining and lumber properties in that district, has left the Province after an extended business visit. Discussing proposed work on the Walhalla group of mineral claims he stated that development would be carried out on a somewhat larger scale than heretofore. A tunnel will be driven on a low level and during the summer there will be considerable diamond-drilling done. Camp is to be established for the commencement of these operations as soon as weather conditions permit, which is expected to be sometime in March.

Penticton, B.C.

At a convention of the Associated Boards of Trade of Eastern British Columbia resolutions were passed endorsing the proposal that the government should

purchase locally-produced silver at a fixed price of 80 cents for two years; asking for the extension of the present provincial inquiry into the high prices of coal and coke, and into the prevailing high prices of explosives; urging a revision of provincial mining taxation so as to recognize the principle of depletion to a further extent; requesting that the coal enquiry now underway, should cover not only conditions at the Coast, but those also within the zone served by the Crow's Nest Pass Collieries; and asking of the Railway Board a revision of the freight rates on metals. The Convention was largely attended and a report was submitted by Commissioner Starkey covering the mining operations for 1920 in the Eastern Districts of British Columbia which proved that, notwithstanding adverse conditions, the past year has been notable in point of development.

Hedley, B.C.

No definite word has been received as to the plans of the Hedley Gold Mining Company, although it is confidently expected that the Nickel Plate Mine will be re-opened shortly. In the meantime interest in the community is centred on the reported discovery of a prospect close to the present mine that gives promise of developing into another real producer. T. Griffin, an old-time resident and one of the first drillers in the Nickel Plate, is the locator. The new property is said to have a showing about 100 feet wide on the surface from which government assays have given returns of $85 a ton in gold. Mr. Griffin expects a general assay to show at least $45 a ton. He is busy at present in constructing a trail and making other preparations for serious development.

Nelson, B.C.

Two new demands are being made upon the British Columbia Department of Mines by the B.C. Prospectors Protective Association through the Nelson Branch of that organization. One is that prospectors should be extended financial assistance to the extent of from $1500 to $2,000 for the development of properties favorably reported upon by District Mining Engineers and the other that stakes used in the locating of claims should bear a government metal disc. These requirements, and the arguments in their support, have been couched in resolutions and forwarded to Hon. John Oliver, premier; Hon. Wm. Sloan, Minister of Mines, and other members of the government.

The Queen Mine, the original producer of the Sheep Creek Gold Mining Camp, has been leased by C. H. Cassill, of Spokana Wn. He also has taken over the Ore Hill Group, Mount Vernon. The former consists of fifteen crown-granted claims and the latter of five similar claims. On the Queen Group is a 20-stamp Mill. The new operating company will be known as the Queen-Ore Hill Mines Company Ltd. which will be incorporated under the laws of British Columbia with a capital stock of $250,000. The sum mentioned in the transaction is $150,000, the final payment being due July 1, 1923.

Trail, B.C.

Ore receipts in gross tons at the Trail Smelter of the Canadian Consolidated Mining & Smelting Co. between February 7th and 14th incl. were 8,987. This brings the total for the year to 49,515 tons. Of the former the Company Mines contributed 8,746 tons, the biggest individual shipper being the Bluebell, Riondel, with 122 tons.

Greenwood, B.C.

The Providence Mine, near Greenwood, after several months idleness, is to resume operations. The plant is being put into condition and work is to be opened up on the 600 and 700 foot levels.

Victoria B.C.

The British Columbia Government has entered into an agreement with the Coast Range Steel Ltd., a new provincial incorporation, under the terms of which the government undertakes to pay bounties on pig iron manufactured in the Province from local ore to an amount not exceeding $1,50 per long ton. It is set out that British capitalists are ready to invest the necessary moneys "not exceeding ten million pounds" in the establishment of the industry upon the execution of the agreement and upon receipt of the report of engineers (now engaged in the Province investigating the iron ore resources) that conditions are suitable. These particulars were laid before the Provincial Legislature recently and it was further stated that the incorporation fee had been reduced to $50 in order to encourage the enterprise.

Provision is being made by the British Columbia Government for the distribution of powder to prospectors at a considerably cheaper figure than it now is available to them. This privilege, however, will be open only to "the bona-fide mineral prospector." It will not be open to those engaged in general mining operations. The concession is being made as a result of strong representations, backed by forcible arguments, from the B.C. Prospectors Protective Association.

There was a notable gathering at Nanaimo on the evening of Saturday, February 19th, when honor was done to the members of the Barton Team, Canadian Western Fuel Co. Ltd., which this year has won the Canadian First-Aid Championship. Hon. Wm. Sloan, Minister of Mines, was present. He presented to each member of the team a suitably-inscribed gold medal, at the same time expressing his appreciation of the achievement of the representatives of the coal miners of Vancouver Island. The interest they had taken in this splendid work was most praiseworthy. The Cumberland team , which had ranked high in the national competitions, also was to be congratulated.

Vancouver B.C.

Title to the Engineer Mine, Atlin District, again is the subject of litigation. Action has been brought by Walter L. Goodwin and associates against the beneficiaries under the will of Captain Alexander, who owned the property and had it under development at the time of his death. The plaintiffs allege that they located at the time that surveys were being made for the White Pass & Yukon Ry. and it was because the majority of the locators were engineers that the present mine was named The Engineer. It is alleged that documents relating to early assessment work and surveys for the crown granting of the property were mislaid in the Gold Commissioner's office at Atlin and were not recorded. Subsequently Captain Alexander located and the property has since fallen to relatives of the late Allen Smith, Philadelphia. Custody of the property has been entrusted to J. A. Fraser, Gold Commissioner, Atlin B.C., who, as a result, has been made a co-defendant. The action is in progress.

(Continued on page 202.)

MAJOR F. H. MOODY, B.A.Sc.

Major F. H. Moody, who has recently become associated with Powley and Townsley Limited, with head office at 907 Excelsior Life Building, Toronto, as Secretary Treasurer and Chief Engineer, will prove a most valuable acquisition in maintaining the pro-

MAJOR F. H. MOODY.

gressive policy of such Company. They deal exclusively in a most complete line of electric industrial and mine haulage equipment, also handle the highest type of battery charging and control apparatus and specialize in the sale of the Edison nickel alkaline storage battery.

Major Moody has had a varied experience that will prove both practical and useful in his new duties, an experience that will be of real worth to their already numerous and growing clientele.

Major Moody commenced his engineering experience in 1903 as machinist's apprentice with the John Inglis Co. Limited, Toronto. This was followed by the Mechanical and Electrical Engineering course at the University of Toronto, for which he received his degree of Bachelor of Applied Science (with honors) in 1909. The vacation periods were spent in practical work with the General Electric Company, Schenectady, N.Y., American Locomotive Company, Schenectady, N.Y., and International Steam Pump Company, East Cambridge, Mass. Following a year as Demonstrator in Thermodynamics at the University of Toronto, he was successfully Associate Editor "Canadian Machinery," "The Power House" and "Canadian Foundryman," Toronto; Associate Editor "Machinery" New York and "Canadian Railway and Marine World," Toronto, until July 1915, then he joined up with the 83rd Battalion for overseas service. He served three years overseas with the 116th Battalion C.E., with them he attained the rank of Major. Returning to Canada with that unit in March 1919, he became Assistant Chief Engineer, McLaughlin Motor Car Company, Oshawa, relinquishing that position in January this year to assume the above new duties.

It is suggested that a fusion of the British Columbia Division of the Canadian Institute of Mining & Metallurgy, the British Columbia Chamber of Mines, the Prospectors' Assn., and the Mining Bureau of the Board of Trade, all centred at Vancouver B.C., would be in the best interests of the provincial mining industry. The proposal is being considered. As these organizations all have the same object there is now much overlapping in their work which, of course, would be overcome by the formation of one large and active organization.

Present indications are that there will be a large delegation of British Columbia mining men in attendance at the Third International Mining Convention to be held at Portland Ore. early next month. Hon. Wm. Sloan, British Columbia Minister of Mines, expects to be present and, if he is able to make such arrangements, will deliver an address on mining conditions in his Province.

THE COLLIERIES.

The coal situation, from the standpoint of production, is not particularly bright on Vancouver Island at present. Output figures for the month of January are significant, only one large operating concern mining as much coal as in the preceding month. When to this is added the fact that the Pacific Coast Coal Mines Ltd. has been closed down for some weeks with no prospect of an immediate resumption and also that the Herewood Mine, Canadian Western Fuel Co. Ltd., is not now producing, it becomes evident that the trade is not in a healthy or flourishing state. With these two mines idle a considerable force of men has been added to the ranks of the unemployed and, from what can be gathered, it is quite likely they will be out of work for a more or less protracted period.

As has been suggested the explanation evidently is to be found in general slackness of trade. The idea that high prices, and consequent hesitancy on the part of the domestic consumer to make purchases, is responsible is scouted by most of those connected with the operating end of the business. They assert that the local demand for coal is influenced almost entirely by the severity or the mildness of the seasons. Of course this does not apply to that used for industrial purposes nor to that sold for shipping from the bunkers. The latter, one of the mainstays of the Island industry, is said to have fallen off recently.

Some operators declare that the Island Collieries must build up a greater foreign trade. They must, it is said, be in a position to successfully compete with the Utah State coal in the State of Washington and, with a water haul as against a long overland haul, also should be able to do in California. With such fields open there would be no question of the maintenance of a steady market that would keep the mines active to the limit of their productive capacity.

It is possible that the British Columbia Coal Inquiry, now in progress, will disclose some interesting information on the relationship of the Canadian Pacific-Coast coal industry to the home and possible foreign markets.

The discovery of a seam of coal, said to be ten feet in height, at a depth of four hundred feet on the Sumas Indian Reservation near Abbotsford, B.C., has occasioned some excitement in that district. Exploration is planned to determine the extent of the deposit and whether it can be developed commercially.

A prospect shaft has been sunk on coal outcroppings situated on Round Island, near Dodds Narrows, a few miles for the city of Nanaimo. John Arbuthnot, of Victoria, is interested in the property. He and his associates are said to control some 10,000 acres of lands in this section. They plan to instal the necessary plants for operations without loss of time and say that shipments of coal may commence within two or three months.

C. E. Miller, known as the "Coal King of the Klondyke", paid his first visit to the "outside" in twenty years a few weeks ago. He spent his vacation in Vancouver and Victoria. Mr. Miller went into the Yukon in 1897 and the greatest part of his time since has been spent in coal operations. It was while he was voyaging down the Yukon river on his first trip to Dawson that he noticed showings at Five Finger Rapids and Tantalus. At the latter point a mine was developed on a large scale and for ten years supplied the city of Dawson with fuel as well as feeding the bunkers of a fleet of river boats operated by the White Pass and Yukon Railway Company. The present workings of the Tantalus Mine now are being abandoned and the plant is being moved to a new slope. In the old mine the coal assays ran 16 per cent ash while returns from the new seam showed only 2.69 per cent ash. Moreover the material can be handled by gravity to the river landing-stage

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THE REED-WEKUSKO MAP-AREA, NORTHERN MANITOBA

Memoir 119, Canadian Geological Survey, is a report by F. J. Alcock on the pre-Cambrian exposures in the Reed-Wekusko map-area, better known as adjoining the area containing the Flin Flon and Mandy orebodies, and a number of gold occurrences. Field work on which the report is based was done in 1917 and 1918. Full references to previous literature are given, including numerous mentions of the district in the "Canadian Mining Journal" by Dr. R. C. Wallace, Prof. deLury and others. A description of the district was also given by Dr. Alcock before the Canadian Institute of Mining & Metallurgy at the Winnipeg General meeting last October.

In addition to description of the geological features of the district, which is quite detailed, the Report contains references to climate, agricultural possibilities, and industries. The climate does not appear to be unduly rigorous, and gardening has been successfully carried on in the hot and sunny period of a short Summer, killing frosts being reported as not occurring between the middle of May and the middle of September. Interesting photographs of early native stone-implements are included. The district has been swept by forest fires. Fishing is an important resource of the district. The rivers have a small winter flow, which interferes with their power possibilities, and the nearest water-power capable of producing all the year round is Bloodstone Falls on the Churchill river, about 100 miles northeast of Wekusko Lake.

A summary of Dr. Alcock's conclusions on the economic geology of the district were contained in a report of the proceedings of the Winnipeg Meeting of the C. I. M. & M. (see page 904, issue 5th November 1920

The Canadian Miners' Buying Directory.

Acetylene Gas:
Canada Carbide Company, Ltd.
Canadian Fairbanks-Morse.
Prest-O-Lite Co. of Canada, Ltd.

A.C. Units:
MacGovern & Co

Agitators:
The Dorr Co.

Air Hoists:
Canadian Ingersoll-Rand Co., Ltd
Mussens, Limited.

Alloy and Carbon Tool Steel:
H. A. Drury Co., Ltd.
International High Speed Steel Co., Rockaway, .
Peacock Brothers Limited.

Alternators:
MacGovern & Co

Spielman Agencies, Regd

Aluminium:

Amalgamators:
Northern Canada Supply Co.
Mine and Smelter Supply Co
Wabi Iron Works.

Antimony:
Canada Metal Co.

Antimonial Lead:
Pennsylvania Smelting Co

Arrester, Locomotive Spark:
Hendrick Manufacturing Co

Arsenic White Lead:
Coniagas Reduction Co.

Assayers' and Chemists' Supplies:
Dominion Engineering & Inspection Co
Lymans, Limited
Mine & Smelter Supply Co
Pennsylvania Smelting Co.
Stanley, W. F. & Co., Ltd.

Ash Conveyors:
Canadian Link-Belt Company

Ashes Handling Machinery:
Canadian Mead-Morrison Co., Limited
Canadian Link-Belt Co., Ltd.

Assayers and Chemists:
Milton L. Hersey Co., Ltd
Campbell & Deyell
Ledoux & Co.
Thos. Heys & Son
C. L. Constant Co

Asbestos:
Everitt & Co.

Balls:
Canadian Foundries and Forgings, Ltd
Canadian Steel Foundries, Ltd.
Hull Iron & Steel Foundries, Ltd
Fraser & Chalmers of Canada, Ltd
Peacock Brothers Limited.
The Electric Steel & Metals Co
The Wabi Iron Works.
The Hardinge Conical Mill Co

Ball Mills:
Hardinge Conical Mill Co.
Hull Iron & Steel Foundries, Ltd
Mine and Smelter Supply Co.
Fraser & Chalmers of Canada, Ltd
The Electric Steel & Metals Co
The Wabi Iron Works

Balances—Heusser:
Canadian Fairbanks-Morse Co., Ltd
Mine and Smelter Supply Co

Babbit Metals:
Canada Metal Co.
Canadian Fairbanks-Morse Co., Ltd
Hoyt Metal Co.

Ball Mill Feeders:
Fraser & Chalmers of Canada, Ltd
Hardinge Conical Mill Co
Hull Iron & Steel Foundries, Ltd

Ball Mill Linings:
Hardinge Conical Mill Co
Hull Iron & Steel Foundries, Ltd

Belting—Leather, Rubber and Cotton:
Canadian Fairbanks-Morse Co., Ltd
Canadian Link-Belt Co., Ltd
The Mine & Smelter Supply Co
Northern Canada Supply Co
Jones & Glasco.

Belting:
R. T. Gilman & Co
Gutta Percha & Rubber, Ltd

Belting—Silent Chain:
Canadian Link-Belt Co., Ltd
Hans Renold of Canada, Limited Montreal, Que
Jones & Glasco (Regd.)

Belting (Transmission):
Goodyear Tire & Rubber Co

Belting (Elevator):
Goodyear Tire & Rubber Co

Belting (Conveyor):
Goodyear Tire & Rubber Co.
Gutta Percha & Rubber, Ltd.

Blasting Batteries and Supplies:
Canadian Ingersoll-Rand Co., Ltd
Mussens, Ltd.
Northern Canada Supply Co.
Canadian Explosives, Ltd.
Giant Powder Co. of Canada, Ltd.

Bluestone:
The Consolidated Mining & Smelting Co

Blowers:
Canadian Fairbanks-Morse Co., Ltd
MacGovern & Co., Inc.
Northern Canada Supply Co.
Fraser & Chalmers of Canada, Ltd

Boilers:
Northern Canada Supply Co.
Canadian Ingersoll-Rand Co., Ltd
Marsh Engineering Works
MacGovern & Co., Inc.
R. T. Gilman & Co.
Fraser & Chalmers of Canada, Ltd
The John Inglis Company
Wabi Iron Works.

Blue Vitriol (Coniagas Red):
Canadian Fairbanks-Morse Co., Ltd

Bortz and Carbons:
Diamond Drill Carbon Co.

Boxes, Cable Junction:
Standard Underground Cable Co. of Canada, Ltd
Northern Electric Co., Ltd.

Brazilian Rough Diamonds:
Diamond Drill Carbon Co.

Brazilian Mica:
Diamond Drill Carbon Co.

Buggies, Mine Car (Steel)
Hendrick Manufacturing Co

Brazilian Ballas:
Diamond Drill Carbon Co.

Brazilian Rock Crystal:
Diamond Drill Carbon Co

Brazilian Tourmalines:
Diamond Drill Carbon Co.

Brazilian Aquamarines:
Diamond Drill Carbon Co.

Bridges—Man Trolley and Rope Operated—Material Handling:
Canadian Mead-Morrison Co., Limited

Bronze, Manganese, Perforated and Plain:
Hendrick Manufacturing Co.

Buckets:
Canadian Ingersoll Rand Co., Ltd
Canadian Mead-Morrison Co., Limited
The Electric Steel & Metals Co
R. T. Gilman & Co.
Hendrick Manufacturing Co
Canadian Link-Belt Co., Ltd
Marsh Engineering Works
Mussens, Ltd.
MacKinnon Steel Co., Ltd
Northern Canada Supply Co.
Fraser & Chalmers of Canada, Ltd
The Wabi Iron Works

Buckets, Elevator:
Canadian Link-Belt Co., Ltd
Hendrick Mfg. Co
Peacock Brothers Limited

Cable—Aerial and Underground:
Canada Wire & Cable Co
Northern Canada Supply Co
Standard Underground Cable Co. of Canada, Ltd

Cableways:
Canadian Mead-Morrison Co., Limited
Fraser & Chalmers of Canada, Ltd
Mussens, Ltd
The Wabi Iron Works
R. T. Gilman & Co

Cages:
Canadian Ingersoll Rand Co., Ltd. Montreal, Que
Northern Canada Supply Co
Fraser & Chalmers of Canada, Ltd
The Electric Steel & Metals Co
The Mine & Smelter Supply Co
Mussens, Ltd
The Wabi Iron Works

TORONTO MINING STOCK QUOTATIONS.

Quotations on Active Stocks on Standard Stock Exchange for week ending March 9, 1921.

Silver	High.	Low.	Last.
Adanac Silver Mines, Ltd..	1.6	1.6	1.6
Bailey	3.5	3.2	3⅝
Beaver Consolidated	40	38	38
Coniagas	2.10	2.00	2.05
Crown Reserve	18	15	17½
Gifford	1¼	1¼	1¼
Hargraves	1½	1½	1½
La Rose	27	25	25
McKin.-Dar.-Savage	28	27	27
Mining Corp. of Can.	1.09	1.00	1.01
Nipissing	9.25	8.50	8.50
Ophir	1¼	1¼	1¼
Peterson Lake	9	8	9
Silver Leaf	1¼	1¼	1¼
Temiskaming	25	25	25
Trethewey	16½	15	16
Gold.			
Apex	2	2	2
Atlas	20	18	19
Dome Extension*	60	54	58
Dome Lake	3	3	3
Dome Mines	18.00	17.40	18.00
Gold Reef	4	3½	3⅝
Hollinger Cons.	6.70	6.60	6.70
Keora	18¼	16¼	16¼
Kirkland Lake	50	48	49¼
La Palme	4	4	4
Lake Shore M. Ltd	1.20	1.16	1.16
McIntyre	2.00	1.95	1.96
Newray Mines, Ltd	8¼	7.7	7.7
Porcupine Crown	23	21	21½
Porcupine V.N.T.	21½	18½	19
Schumacher	24	24	24
Skead	51	25	51
Teck-Hughes	10½	10	10
Thompson Krist	7¼	7¼	7¼
West Dome	8	7	7⅜
West Tree Mines Ltd.	5	5	5
Wasapika Gold M. Ltd.	4	4	4
Oils.			
Ajax Oil	31	30	31
Vacuum G.	16	16	16

* Odd lots.

TORONTO METAL QUOTATIONS.

	March 10
Copper, electro	18
Copper, casting	17¾
Tin	40
Lead	6½
Zinc	7¾
Aluminum	31
Antimony	8

MONTREAL METAL QUOTATIONS.

Following are fair average prices for ingot metals (in less than car-load lots) at Montreal:

	Cents per pound.	
	Mar. 2nd	Mar. 9th
Copper, electro	17½	17½
Copper, casting	17	17¼
Tin	37	36
Lead	5½	6
Zinc	5½	7¼
Aluminum	35	33
Antimony	7½	7¾

TORONTO COAL PRICES.

Toronto March 9.—Very little anthracite coal is moving and generally speaking the consumption of coal to-day is considerably in excess of production, which means that reserve stocks are being eaten up and will have to be replenished shortly. Just when this point will be reached, however, is problematical. There has been some improvement in respect to enquiries at least but the movement of coal is very light. In bituminous coal from $2.75 to $3.50 is being asked for lump and $1.75 to $2.75 for slack, mine price. Smokeless is quoted at $8.50, Toronto, Canadian funds. Anthracite prices are unchanged. Stove and nut are are quoted at from $8.50 to $8.75: egg $8.25 to $8.50 and pea coal $6.50, mine prices in American funds.

HILLCREST COLLIERIES ANNUAL REPORT.

Net profits and amount available for common stock dividend after deduction of bond interest and preferred dividends in 1920, compare with previous years as follows:

	Profits	Available for Common stock Dividend	Percent earned on Common
	$	$	$
1917	91,211	25,562	2.55%
1918	110,295	60,288	6.02%
1919	112,641	72,581	7.25%
1920	168,704	126,025	12.6 %

During the year 1920 the dividend rate on the common stock was raised to seven per cent. The liabilities include a Contingent Reserve of $275,000, and the surplus stands at $260,077, compared with $219,051 at the close of 1919.

At a recent meeting of the German Geological Society following a discussion on recent discoveries of prehistoric human remains near Weimar, a member exhibited a photograph of an old Chinese bronze Moloch in which the head of one of the offered victims is portrayed with much exactness. The head is sharply distinguished from the Mongolian type, and the general artistic merit of the bronze is such as to warrant the conclusion that the sculptor had a living model. The head is noteworthy because it has all the characteristics of the Neanderthal man, the prognathous under-jaw, the strongly marked prominences of the eyebrows, and the low, receding forehead of the type. It was suggested that the artist actually modelled his work from a living Neanderthaler man.

Dr. KEMP LECTURING AT McGILL.

Dr. Kemp, of Columbia University, is giving several lectures at McGill University during the week beginning the 14th March, on some practical applications of geology.

PERSONAL.

Mr. J. B. Tyrrell accompanied by Mr. Wm Freeheville of London, England, is visiting Calgary and district.

EDITORIAL

The New Oil Regulations

If the purpose of the new oil regulations in the North West is to safeguard the possession of the oilfields by the Federal Government, this would seem to have been secured, so far as is humanly possible, by the drafting of the regulations, but is is doubtful whether they will bring about the best technical extraction of the maximum quantity of oil, over the largest possible period of time, at the minimum cost of production; or whether the system of granting licenses to search, and the subsequent granting of leases of selected locations, is such as will bring about speedy development of such reservoirs of oil as the North West may, by private enterprise, be demonstrated to contain.

The regulations are extremely onerous in that they require large expenditures to be made within a short time, and require, in addition, persistent and continuous expenditures of money and labour over a period, but, if and when the expenditures are made, and the searcher is rewarded by the finding of oil in commercially paying quantity, the Government reserves the right to three fourths of the prospected location. Possibly no legitimate exception can be taken to this reservation, seeing that, in any case, the Government owns the oil, but it seems reasonable that the person who finds the oil should be given first option of the leases of the adjoining three fourths location, and is entitled to some protection against drainage of his first leased quarter-location by holes drilled with that purpose in view around the discovery location.

There is also reason to criticise the nature of the unit of leasing, which is prescribed as approximately rectangular in shape, with subsurface boundaries that "shall be the vertical planes in which the surface boundaries lie". The difficulty, and probably also the inadvisability, of prescribing vertical boundaries to a fluid deposit, has been previously raised, and the United States Senate, because of acknowledged and flagrant deficiencies of customary leasing units for gas and oil, has committed to the United States Geological Survey the duty of formulating an appropriate unit.

The leasing laws both in Canada and in the United States were designed to apply to solid and stationary mineral deposits, and they have been unthinkingly applied to a fluid deposit such as petroleum, even in ungranted territories where individual ownership did not exist. But if the matter is considered, there does not appear any substantial reason — except that of convenience and of conformation to surface landmarks — to select geometrical figures plotted upon a map as leasing units for a fluid or semi-fluid deposit bounded by geological structures. The whole proceeding is utterly illogical.

It is, of course, obviously necessary that before natural leasing-units, based on geological structure, can be prescribed, the geological structure must be known and plotted. This would necessitate a through preliminary survey, and a good deal of drilling, by the lessor — in this case the Federal Government — and presumably, the Government will not undertake such a task. At the same time we can suggest no good reason why it should not.

The new regulations are designed to bring about the desired geological investigation at the expense and through the initiative of private enterprise, while reserving to the Government full possessory powers and the major advantage of any discoveries of commercial value. In the last resort the Government reserves the right of re-entry upon compensatory payment.

To have one's cake and eat it too has always been regarded as a difficult accomplishment, but the new oil regulations seem to attempt this.

In view of the remoteness of the oilfield of the Mackenzie Basin, and of the fact that the problem of transportation of the oil to market is by all odds the one most difficult of solution, some questioning of the advisability of the adoption of the rectangular leasing unit is suggested.

Would not the Government have better achieved its purpose if it had selected a suitable leasing unit of large dimensions, amounting in fact to a concession, and have allowed one operator only to have the privilege of working this concession on a royalty basis?

A little consideration of the things that will happen if the North West should prove to contain much oil will indicate that only large-scale operations, combining ownership of costly pipelines, will make possible an

industry of permanence and magnitude, and that, little by little, the big operator will absorb the smaller ones, and will by purchase and assignments and other means, eventually become possessed of the large and consolidated tracts of leases that are necessary to successful and profitable oil mining. We take it the terms are synonymous. In the meantime, however, there will occur much speculation and creation of values by the creation of titles and their bartering, that will represent no real assets, and will eventually have to be paid for by the ultimate consumer.

This last-named probability is not, however, the fundamental objection to the regulations it is desired to disclose. The real flaw suggested is that any attempt to set vertical boundaries to a fluid accumulation, without reference to geological structure, is a confusion of terms and an illogicality.

The business of the Government is to see that the Mackenzie Basin oil is put on the Canadian market at the first possible moment and at the lowest cost, and if, by giving oil-mining rights over large tracts to large oil companies, this object is best attainable, the Government, with an ungranted and promising virgin oilfield at its disposal, is in a position that may be likened to the awarding of a large construction contract. The contract for oil-mining should be given to the tenderer whose equipment and financial resources will guarantee the quickest and most permanent return in the form of royalties, and the contracting firm should be assumed to be merely the agent of the Government.

The only privilege the Government is really able to dispose of is the right of access to the oil-pools. It cannot guarantee the presence of oil, but it can grant the right of privileged access.

The situation has an analogy — only the physical conditions are reversed — in the leasing of mining rights to submarine coal. In this connection it has been abundantly demonstrated that the real privilege — the thing of intrinsic value—is the right of access at the shore to a deposit covered by the sea, and the division of the coal into leasing units — and not into mining areas — has been found to be a mistake requiring legislative correction. The original error arose through unthinking application of the customs of leasing mineral deposits under surface cover to the entirely different conditions of submarine deposits.

The granting of a number of licenses to search, unguided by any connection with the nature of the occurrence of the oil below, may lead to the drilling of wells in places where it would be better if they were not drilled, and maybe also to the drilling of too many wells; and if this should occur, the only gift the Government can dispose of — namely the right of access— may be squandered and made of less value.

The method which purely scientific considerations would indicate to ensure the maximum and least costly production of oil in the North West, is to lease areas with boundaries suggested by geological structure. If it should be objected that such a procedure would foster monoplies, may not the question be put whether oil-mining and sale under the unique conditions that exist in the North cannot best be undertaken by experienced companies having large financial resources and a thorough knowledge of oil transportation, of oil refining and technology, and markets?

In all the foregoing considerations—which are put forward merely as the detached viewpoint of an individual — it is assumed that the competent contractor suggested, operating on a scientifically selected and presumptive oilfield, would act merely as the agent of the Government, and would acquire no fee simple or inalienable possessory rights.

A GOLDEN OPPORTUNITY.

Canada's preferred position as a gold producer at this time is in striking contrast to that of South Africa and Australia, where the steadily dropping premium on new gold is eliminating those mines which have depended upon the premium for a profit. Samuel Montagu & Company's circular forecasts that if the price for South African gold drops to 85 shillings per ounce—that is to the normal price of gold—14,000 Europeans will be thrown out of employment by the closing down of mines, and that disaster will come to from one-quarter to one-half of the industry. Since 1915, the gold output of United South Africa has declined by 2,472,587 ounces, the record production of 4,867,604 ounces, in 1915, comparing with 2,395,017 ounces in 1920.

While sterling exchange seems likely to maintain its steady climb to parity in New York, there are no good grounds to expect similar immediate appreciation of Canadian exchange, and, while to the business interests of Canada in general the discount on the Canadian dollar in New York is regarded either as a monitor or an irritant—according to one's business—to the gold producer it is sweetness unalloyed, but, unless we are all mistaken in the nature of Canada's future, it is a condition that will persist only for a period. It is quite understandable, therefore, that Canadian gold mining companies will put out a maximum effort to increase gold production while the discount is in existence, even though their efforts will in themselves do much to restore our dollar to parity. The gold producer in Canada is uniquely situated in that he is able to combine real service to the country with equally real and tangible profit to himself. If there is any person able to plead guilty to being the culprit who pockets the exchange differential it is the Canadian gold-miner, and it is a pleasing occupation in which our governments, federal and provincial, ought to be aiders and abettors. Gold is a commodity, having a price relative to the demand for the metal, and there are gold deposits in Canada that are workable at a profit to-day that will not be so workable when our dollar looks the eagle in the face. It almost looks as if the present time were one during which the powers that govern this country should give to the gold-mining industry the maximum of aid and comfort and the minimum of restriction.

A DYING INDUSTRY.

We are officially informed that the Algoma Steel Corporation has closed down its Magpie Mine, owing to trade conditions, and that the prospects for reopening in the near future are not bright. The Magpie Mine was the only iron-ore mine in Canada in operation, and there is reason to believe that the mineral statistics for 1921 will show a smaller tonnage of iron ore mined in Canada than since these statistics were commenced, namely in 1886. The production in 1920 was the smallest since 1900, but the decline seems now to have proceeded to the point of complete extinction.

The discussion of the Canadian Institute of Mining & Metallurgy on this question now therefore assumes the aspect of an ante-mortem consultation. The remedy was indicated, but the family thinks it cannot pay the cost of the medicine. Meantime the patient has to all appearances died.

In the United States, where they have iron ore in great quantity, very accessible and of most excellent quality, some of the brightest minds in that country have commenced the task of developing, by beneficiation, the equally imposing reserve of low-grade ores that lie right alongside the more valuable deposits in the Lake region. In Canada, where our iron ores are not comparable either in quantity or quality with the Lake ores of present commercial grade, and where our need of intensive development of what we have is admittedly much greater, we are relinquishing even the little development of native iron-ores that stood to the country's credit, and some day, possibly, we shall be buying beneficiated ores from Babbitt

An example of the general futility of our methods was given by the field day of discussion which the House of Commons recently indulged in with regard to natural resources. After talking for many hours, and disclosing many different viewpoints, the motion suggesting action, and in particular suggesting action to assist the mining of iron ore in Canada, was lost. Dr. Manion who introduced the question of iron ore development said "a pound of action is worth a ton of oratory" whereat the House cheered, but proceeded forthwith to talk until after midnight, and ended by doing nothing. And meantime the one really practical attempt to mine our native ores ceases.

THE MACKENZIE OIL REGION

The story of the Imperial Oil Company's search for oil in Western Canada recounted at the annual meeting of the Canadian Institute of Mining and Metallurgy, last week, by Mr. J. Ness, of the company's staff, was a most interesting one. Stories of new mineral discoveries are always welcomed by members of the Institute, but unusual significance attaches to the discovery of oil in the far northwest. It is believed by many that exploration will prove the existence of large quantities of oil in the Mackenzie basin and the fact that the first well sunk at Fort Norman is a successful one gives good ground for optimism.

Those who made public their observations in the Mackenzie district have reported signs of oil in many places. The geologists who have worked in the district for the Department of Mines have indicated it to be a promising field for oil exploration. Mr. Charles Camsell, Deputy Minister of Mines, who knows the field well attaches great importance to the results of the work done during 1920 and considers the discovery at Fort Norman one of the most important mineral discoveries of recent years. Other geologists have also been much impressed by the discovery and the public generally has shown much interest in this possibly new source of petroleum. Under the circumstances the story told by Mr. Ness and the description of the salient features o the district by Mr. E. M. Kindle were listened to by a very appreciative audience. It is to be hoped that both papers will soon be published.

Fort Norman is far from civilization and if oil is found in large quantities it will be some years before it is marketed. Problems of transportation, while serious, will be met and overcome as the work progresses. At present Fort William is about 1,000 miles from the railroad. The rivers make access to the field possible and with improved facilities for crossing the portages the journey will not be a difficult one though slow. Provisioning will be costly during the period of exploration and the season for river travel short. Such difficulties will not prevent the development of the field; but they will make progress necessarily slow. The results obtained during 1920 will attract oil men from afar and if they are reasonably successful in finding oil; we may expect that means will be found of getting the oil to market.—R. E. H.

THE PROPOSED SWASTIKA-WESTREE RAILWAY LINK.

Editor,
Canadian Mining Journal.

Sir:—

In the advertisement, appearing in your journal, over the name of the Hon. H. Mills, Minister of Mines for Ontario, the statement is made that Ontario in 1919 produced 38 per cent of the total mineral output of Canada and that the output of mines and metallurgical works, of the province, during the same year was worth $58,583,916.

This is all very nice for the Minister of Mines to refer to as inducements to prospectors and capitalists to "Come in the water is fine". Seeing, however, that mines are admittedly a wasting asset, this creditable showing cannot be maintained without new and additional mines being added to the list of producers. The very fact that this production was, with one or two exceptions derived from properties situated adjacent to rail or water transportation should show to the most ignorant, the need of providing railway transportation facilities for the new camps.

For the last ten years, Gowganda have been asking for a railway, to-day West Shiningtree and Matachewan are added to the list of new camps in need of the "Iron Horse". As a result the people of Sudbury, Westree, Shiningtree, Gowganda, Matachewan, Swastika and a large majority of the people of Elk Lake are asking that the Government build a railway from Westree, Shiningtree, Gowganda, Matachewan, Swastika. This 80 mile line would aid the development of existing mines, assist in securing capital for the development of promising prospects, into more attractive prospecting and in general give to those interested in prospecting and mining a faith in the Government's intention to do its big towards promoting the mining

sion of the mining industry. A faith that at the present is mighty close down to zero.

The producing properties at Gowganda, conclusively proves that with ample capital intelligently expended, mines can be made out of a prospect. Exploration on the Wasapika, Westree, and Herrick have disclosed ore in commercial qualities. Trenching and diamond drilling at Matachewan have proved equally successful. Iron ore, partly developed, is also on the route of this proposed line.

It is rather peculiar, that the argument advanced by the Hon. H. Mills, that Ontario contains millions of acres in which the geological formations are favorable for the occurrence of minerals, should be considered as all sufficient inducement to the prospectors and mining men while the same argument, plus shipping mines and prospects partly and sufficiently develop to indicate their worth, are not good enough reasons, in the minister's mind for the construction of a few miles of railway.

Chas. L. Sherrill, in his report to the Hudson Bay mine stockholders in 1919, shewed conclusively the position of Gowganda, when he made the following statement:—

"Your Company has properties there (at Gowganda) that have high-grade Silver veins that merit further expenditure to prove if they will develop into producing mines, as soon as the government provides better transportation facilities into the camp."

When that is the position taken by an active mining company, that all ready owns property partly developed, what possible change will the prospectors have of securing capital to develop his holdings? To the prospector the finding of a ready purchaser who will develop properties of merit is of far more importance than are reductions in cost of recording and holding of mining claims, as it is the cash derived from sales rather than the ease by which claims can be secured, that attracts the prospector to any given district or province.

The providing of schools for prospectors will only serve to aid the provinces who strive to ease the burden of pioneers who assume the financial risks involved in converting raw prospects into producing mines.

British Columbia has for years recognized the just claims to asistance in the matter of roads to new mining camps. The Province of Manitoba is to-day surveying for a railway into the Flin Flon mining district, and without Ontario speedily gets into line, her trained prospectors as wel as capitalists, will go to assist the development of the provinces that are showing a desire to help them.

As stated above, Ontario has schools for prospectors, and the Ontario Public Service Commission recommends a special training college for magistrates. Why not also have a special college for the purpose of teaching cabinet ministers, the true relationship which the different industries bear to each other and to modern life?

Were this relationship thoroughly understood, the mining industry would not need to go begging for aid.

We insist that the geologist must have several years training before he can be trusted to report upon the geological and economic features of a district. The hard-headed business man will require a trained mining engineer's report before he will invest in a mine. We require properly trained men to carry on our small and comparatively insignificant affairs, but take the raw product from the law office, farm, or factory and without preliminary and suitable training put them, slap-bang, into the most important office that the people of the province or country have, expecting them to adjust and run, to everyones' happiness and satisfaction, the delicate and complicated machinery pertaining to a Government!

Gowganda, March 7th, 1921.

L. O. HEDLUND.

PERSONALS.

Mr. Sam. Sainsbury, the well-known Hudson Bay, prospector is telling some interesting stories of life in the far north, in articles which are appearing in the "Star Weekly", Toronto. Mr. Sainsbury, a few years ago, staked iron ore deposits on the Belcher Islands that are believed to be very valuable.

Mr. Robt. A. Bryce of Toronto has been appointed to represent the mine operators on a board of enquiry concerning a wage dispute at Cobalt.

Mr. R. C. Wallace, Commissioner of Northern Manitoba, is reported to intend resigning that position soon. He is Professor of Geology at the University of Manitoba and left the University temporarily to become the first commissioner. He has made a big success of his work and has been of material help in drawing attention to the mineral resources of Northern Manitoba.

Mr. Geo. C. Mackenzie, secretary of the C. I. M. & M., was in Toronto last week.

Mr. Jos. Houston, who has been recently in Mexico, is in Toronto. He intends to return shortly to Mexico City.

INCREASED GOLD PRODUCTION SOON.

While the winter is comparatively a mild one, it is still cold enough in the Northern Ontario mining districts to keep most of the snow and ice from melting. It is not likely to be many weeks now, however, before the streams are running in such volume that greatly increased power will be available. At the mines preparations are being made for the handling of much larger tonnages and before the summer is far advanced the gold mines of Ontario should be making a bigger production than has ever been possible before. There is not sufficient power for the present plants but additional milling facilities are being installed and the development of more water power is contemplated. This has been an exceptional winter; but an endeavor will be made to meet such conditions better if they should recur.

THE NOME GOLD FIELDS.

The famous Nome placer gold fields, discovered in 1898, have now produced gold worth nearly eighty million dollars. Much of the gold mined in this region is won by the use of dredges. Twenty-two of these machines were in operation in 1919 and made a total gold output of $450,000, and open-cut and deep mining in that year brought the value of the total gold output of Nome and other districts of the Seward Peninsula up to $1,360,000. In addition to the gold, about 56 tons of placer tin and 20 ounces of platinum were produced on Seward Peninsula in 1919. These operations are briefly described in a report entitled "Mining on Seward Peninsula, Alaska" (Bulletin 714-F), by George L. Harrington, just issued by the U. S. Geological Survey Department of the Interior.

The British American Nickel Corporation, Limited

W. A. CARLYLE, M. E.

During the past three years, despite the many diffienlties arising from the very abnormal conditions due to the war and its aftermath, a large and important mining and metallurgical enterprise at a heavy capital expenditure and complete in every detail has been developed in Canada. Three large plants have been designed and erected, the Mine and Smelter plants near Sudbury, Ont., and the Refinery, near Ottawa. These plants have already demonstrated that they will achieve a high degree of efficiency both in working costs, in the tonnage of ore they will handle and in the very pure refined metals produced. However, owing to the unprecedently bad market for all metals, the Compay, which recently had arranged for a new issue of bonds against which sufficient capital has been provided, has decided to cease operations for the time being, but will resume as soon as the demand for and prices of the metals become normal. With the great reserves of ore this company will operate for many years, it has the promise of becoming one of the most important producers of nickel in the world.

The following is a brief description of the three plants completed early in 1920 and of the initial operating experiences of this new nickel-copper producing Company, the head offices of which are at Ottawa, Canada.

Mining Property.

The mining lands owned by the Company comprise 17,590 acres in the famous nickel district at Sudbury, of which 12,590 acres are logated in the mineral bearing zone. Important deposits of nickel-copper ore have been found, and more or less explored on several properties, but the present Company confined most of the diamond drilling campaign to the Murray Mine, where a very large body of ore was thus disclosed, to which all recent mining operations are confined.

Murray Mine.

This ore-body, as determined by vertical drill holes, 200 feet apart, outcrops at the surface, and with a very uniform dip of 38 deg. from the horizontal, has been shown to extend 3,600 feet downward on the dip with a thickness varying from 40 to 140 feet of smelting ore. Within the area drilled by the drill holes lie 16,000,000 tons of ore averaging 3 per cent of nickel and copper, sufficient to keep the present plants running for 30 years, and the ore-body undoubtedly extends much farther beyond the holes, the deeper of which discloses a great tonnage of higher-grade ore, containing 4 per cent nickel and copper.

The ore typical of the district occurs in the norite rocks with a footwall of greenstone, and in places granite; and consists of pyrrhotite with some chalcopyrite (Fe. Ni.)S. It also contains a small but valuable amount of the rare metals of the platinum group, all of which will be recovered and separated in the refining process.

THE SMELTER

British American Nickel Corporation, Sudbury District, Ontario.

MURRAY MINE

British American Nickel Corporation Sudbury District, Ontario

Mine Plant.

At the Murray Mine a three-compartment inclined shaft in the foot-wall is now down about 1,200 feet with eight levels opened up, each half in the footwall and half in the ore. A unique method of mining the ore has been chosen that will permit the cheap extraction of at least 90 per cent of the whole ore mass. On each of five levels is a five-ton Canadian Westinghouse locomotive with Edison storage-batteries, running on 24 inch tracks laid with 36 lb. rails and hauling four 4-ton ore-cars of the Granby type. On each level is a motor-generator set for charging the batteries on the third shift. All of this plant is giving great satisfaction.

The drilling is done with Waugh No. 21 turbo-hammer drills using 90-100 lb. air and hollow steel for water feed. There is a large ore-pocket, with finger-gates below every second level, which loads the 8-ton skips in two compartments of the shaft.

On the surface all the buildings are substantial and well built. As enough electric power for the time being could not be obtained, it was decided to instal steam plants at the Mine and Smelter, but so arranged that every machine could later on be electrically driven. In the Mine Power House are three 1,000 H.P. Babcock and Wilcox boilers, 160 lb. pressure, equipped with Weir feed-pumps and large steel coal-hoppers with endless pan-conveyors, feeding the chain grates with slack coal. There is a powerful Allis-Chalmers steam-hoist of the latest design, hoisting at the rate of 1,500 feet per minute, and two Belliss-Morcom air compressors, each yielding, at 250 r. p. m., 2,500 cu. ft. of free air per minute at 105 lbs. Each is fitted with a barometric jet-condenser. There are also two other small compressors, one steam, the other, electrically driven, and. 6,500 to 7,000 cu. ft. air is altogether available.

The blacksmith and drill-sharpening shop is fitted in the most modern manner.

In the Shaft House the ore from the ships, after passing over grizzlies, goes through a 46″x48″ Buchanan-Blake-type rock-crusher into a flat-bottomed bin which feeds the 36″ belt, 300 ft. long, to the top of the Rock House, where the rock, after passing over a 2 inch screen, is distributed by a belt along a storage bin which in turn supplies the seven picking-belts. The equipment in this building is supplied by the Stephens-Adamson Mfg. Co. and the belts by the Dunlop Tire and Rubber Goods Co., Ltd.

Already the mine, although so newly opened up, is easily supplying 1,200-1,400 tons of mixed ore per day and 2,400 tons have been hoisted in two shifts. From 20-25 per cent of the material hoisted is picked out and sent to the waste dump. The smelting ore, coarse and fine, is taken in 35-ton ore cars 1¼ miles to the smelter ore-bins.

About 600 H.P. purchased from the Wahnapitae Power Co. is used for driving motors at the mine and smelter.

The Smelter.

In the Power House, the boiler room has six 1,000 H.P. Babcock-Wilcox boilers, working at 180 lb. pressure, supplied with superheaters and chain grates, also fed from steel bins filled by the endless bucket-conveyor. Weir pumps supply the boiler feed from a Cochrane reheater.

In the Blower-room are four turbo-blowers, 3,600 r. p. m., each direct connected to a steam turbine.

The Refinery at Deschenes, British American Nickel Corporation, Limited.

blowers and turbines being the Rateau-Battu-Smoot design and built by the Dominion Bridge Co., Ltd., Monreal. Two of the blowers each deliver 30,000 cu. ft. free air each at 36 oz. for the blast furnaces and two 36,000 cu. ft. each at 12 lb. pressure to the converters, the steam turbine for each of these being 2,200 H.P. Each turbine has its surface condenser complete in every detail with centrifugal pumps for returning the hot condensing-water to a cooling pond. One unit comprises a 1,100 H.P. turbine, driving one of the blast-furnace blowers, and a 550 K.W. generator, used when the Wahnapitae power fails,which can be used as a motor to direct-drive one or both blast-furnace blowers. On account of the highly superheated steam, 590 to 610 deg., it was found necessary to fit the steam governors of all the turbines with monel-metal parts, which has proved very satisfactory. After a considerable period of adjustment this blower plant is now running very sweetly. Two Westinghouse motor-generators, one 300 K.W. and one 250 K.W. as a reserve, suppy D.C. current to the motors of the electric locos, cranes and converters in the smelter building.

At Pump Lake two vertical motor-driven centrifugal pumps, with steam reserves, supply the water to the mine and smelter, at the last-named of which is a powerful steam fire-pump for the protection of all the property.

In the Smelter building are two blast furnaces, 50x360 inches at the tuyeres, and a third is on the ground. On a strongly-constructed crucible, 24 inches high, stands the single row of steel water-jackets, 14 feet long, 30 inches wide, inner plate ⅝ inches, outer ⅜ inches, with a water space of 5 inches. There are two 4½ inches tuyeres in each jacket, or 24 on each side of the furnace, which is tapped at either end, using a watercooled cast-iron spout for discharging into a settler 20 feet by 30 feet by 5 feet, lined with chrome and magnesite bricks, there being three settlers in all. The matte tap-holes (4) at first gave much trouble, but a syphon tap, invented by Mr. J. H. Gillis, Chief Engineer, solved this difficulty.

On the charging floor, standard-guage tracks on each side of the furnaces, lead to the supply bins and a specially-designed type of charge car drawn by electric trolley-locos gives great satisfaction. Each car is divided into four 4 ton compartments discharging one side into the four feed openings of the furnace while in the centre of the other side is a multibeam weighing device with which the proper weights of coke, ore and flux can be weighed into each section through the valve gates in the bottom of the supply bins.

In the converter aisle are two 60 feet span, 40-ton electric travelling cranes serving the three Pierce Smith basic-lines converters 13 feet by 30 feet, each with forty four 1½ inch tuyeres, electrically rotated. Steel ladles holding 20 tons of matte, or 12 tons of converter slag, are used, and the holes soon made in these by the corrosive matte are now very successfully repaired by fitting in pieces of steel plate by Thermit welding. A hopper, holding 16 tons of flux, fine ore or gravel, is placed by the crane on a Kron weighing device, at the end of each converter, where a weighed charge can be blown in with the Garr gun. The fourth converter is on order, the furnaces and converters having been supplied by the Canadian Allis Chalmers Co.

Smelting Practice.

This practice has many features different from that followed by the other smelters in the Sudbury District. The ore averaging SiO_2 24 per cent, Fe 35 per cent, CaO 3.7 per cent, MgO 4.3 per cent, Al_2O_3 6 per cent, S, 19 per cent, is smelted without any preliminary roasting and the only flux used is converter slag containing SiO_2 16 per cent, Fe 52 per cent, CaO 3.5 per cent, Al_2O_3 3.5 per cent, the charge consisting of 70 to 75 per cent ore, the balance flux with 10.5 per cent coke on the charge. The resulting slags contain SiO_2 35.5 per cent, Fe 30 per cent, CaO 5.5 per cent, Al_2O_3 13 per cent, and 0.24 to 0.34 per cent Nickel plus Copper plus Cobalt.

The low-grade matte from this furnace, containing 11 to 13 per cent nickel and copper is poured into the converters, and blown up to the usual matte containing 80 to 82 per cent copper and nickel and a trace of iron, which is transferred to an oil-fired furnace, and in running from thence through a strong stream of water is very successfully granulated, then wheeled into box cars and shipped to the refinery.

In the converter method, the flux mainly used is ore fines with some siliceous gravel or sand. One aim is to keep the silica in the converter slag as low as possible, it often averaging for days under 13 per cent, which eventually will become the regular practice. This slag is poured in part into large 20-ton cars, poured outside the building onto shallow beds lined with ore fines, broken up and lifted by locomotive cranes, using clam-shell buckets and sent to the smelter bins. Part of the slag is poured into the settlers.

The capacity of the blast furnaces is proving much greater than anticipated, as for the past three months, one furnace has averaged over 800 tons of ore per day, and 1015 tons of ore have been smelted in one day, counting in the ore used as flux in the converters. In the future, greater results will be achieved, especially if the ore fines under 1½ inches, now going to the furnaces, are sintered, a problem now being studied. The amount of flue dust is small, being caught in the dust flues and chambers. The smelter stack is 300 ft. high and 25 ft. inside diameter.

Railways.

The Company's railway system at these plants connects with the Canadian Pacific and Algoma Eastern Railways, and is equipped with the necessary standard locomotives and rolling stock.

Refinery.

Situated on the C.P.R. at Deschêne, Que., near Ottawa, where cheap electric power was available, and other advantageous factors existed, such as an excellent site, water and sufficient labor.

This plant has a capacity of 15,000,000 lbs. of nickel per annum, and at a comparatively small expense can be increased to from 20 to 24 million pounds. This metal is deposited electrolytically by the Hybinette process, and a very high grade product is being produced, containing practically no impurities but a little iron and copper and some hydrogen.

The matte from the smelter passes through two Wedge roasters, each with 8 hearths, and thence to the leaching department, where the copper in part is dissolved with H_2SO_4 and plated out in the electrolytic tanks, the cathodes being melted down and cast into 81 lb. ingots; about 55 tons of copper being produced per 100 tons of nickel.

The leached matte with fluxes is then smelted in especially designed electric furnaces using 24 inch ca-

cular carbon-electrodes, and nickel copper anodes, weighing 200 lbs., are cast in steel moulds. These furnaces, which are proving a signal success, were designed by Mr. Ivar Hole, a Norwegian metallurgical engineer These anodes then go to the nickel-depositing building which covers three acres, and not only is the nickel plated out, but a large amount of nickel-sulphate and also nickel-ammonium salt is being produced for sale to the nickel-plating industries.

The slimes remaining after the nickel anodes are dissolved are collected and concentrated, and will be refined in the precious metals department to yield metal-platinum, palladium, iridium, rhodium and some gold and silver.

In the power sub-station is a very fine electric installation, supplied by the Canadian Westinghouse Co., comprising with transformers, etc., five rotary converters of 4,000 amperes each, three with a range of 70 to 290 volts on the D.C. side. There is also a reserve 1,000 K.W. generator driven by a steam turbine, there being two 1,000 h.p. B. & W. boilers equipped with superheaters, Green's economizers and forced draft.

Personnel.

Managing Director—W. A. Carlyle.
Secretary-Treasurer S. M. Brown.
Purchasing Agent—T. N. Hay.
Consulting Engineer—A. Gronningsater.
Electrical Engineer—R. F. Howard.
Mine Manager—Ernest Hibbert.
Mine Superintendent—H. L. Roscoe.
Smelter Manager—E. J. Carlyle.
Smelter Superintendent—O. E. Jager.
Chief Engineer—J. H. Gillis.
Refinery Manager—R. L. Peek.
Refinery Superintendent—T. Torrel.
Refinery Chief Chemist—F. E. Lathe.

The Situation at Inverness Collieries, N.S.

The Eastern Trust Company of Halifax has been appointed trustee for the creditors of the Inverness Railway & Collieries Ltd., and Messrs. J. A. Walker and Andrew MacKinlay of Halifax are appointed inspectors. The mine is working intermittently, owing to lack of orders.

It is understood that a proposal has been mooted to sink a deep shaft at the shore and drive out seawards with a cross-measure drift to a point connecting with the lowest level in the No. 1 Mine. By this means a good grip of the seaward coal would be obtainable, and the large area of pillar coal lying to the rise of the point of intersection of the proposed drift with the low level workings would be in part worked downwards to this point and sent out by way of the drift. Haulage and pumping problems could be much simplified by the method of winning proposed, if the necessary capital for the undertaking can be raised. The cost of extracting coal from the low levels under present conditions is virtually prohibitive.

The sinking of a deep shaft at the shore line, and the driving of a cross-measure drift with a rising grade proceeding seawards, intersecting superimposed seams at varying distances from the shore line, has been proposed on several occasions in the past for the economical winning of the submarine coal off the Sydney Field and off the Inverness shore, but the suggestion has never received serious consideration. The advantages that such a method would carry with it would include making all submarine coal lying between the shore and the point of intersection of the cross-measure drift into "rise coal" which could be dropped to the main drift by gravity haulages, pulling up the empties at the same time. All problems of pumping would be similarly simplified, although—except in the overlying coal seam nearest to the sea floor—there is very little trouble with water in submarine mining. The trouble is more apt indeed to arise from excessive dryness conducive to dust dangers, and it may be even necessary to lead water into the dry submarine areas. A drift such as is suggested would be of very large dimensions, and would probably be driven as a series of three or four parallel slopes, one being reserved for coal haulage, one for man haulage, and others for transmission of air, power and piping of various kinds. The expenditure required would be extremely heavy, but not heavier than such a slope as was constructed by the Nova Scotia Steel & Coal Company to win its iron-ore areas about two miles out to sea under Conception Bay, Newfoundland. A cross-measure drift would be free from many troubles associated with the working of superimposed coal-seams, and it could be made entirely free from coal-dust dangers with little trouble. The only serious objection to the method, where it connects a number of coal-seams (apart from the expenditure) is that explosions and inundations might be communicated from seam to seam. Explosions could be guarded against by stone-dust barriers and other precautions, but the question of inundation would require some study. The winning of a single seam by the cross-measure drift method is not however open to any of these objections, and it may be taken for granted that undertakings of this kind will become fairly common in the submarine coal areas in Nova Scotia.

The reference made in our issue of the 25th February (page 150) to the matter of hydraulic stowing of pillar wastes was not intended to convey the impression that such a method was applicable to the broken area at Inverness No. 1 Mine, at this stage of the mine's life, but to point out that if the same method of proceeding indefinitely to the deep, leaving ungotten pillars in the rear, was persisted in, it would lead to similar conditions at every submarine colliery. It is suggested that future winnings should be laid out with a view to utilising the flushing method of packing the waste. The most difficult problem will be to find the material for flushing, but similar difficulties have been met and overcome in other parts of the world, and some very unlikely flushing materials have been used for want of better ones.

The greatest drawback to successful submarine coal mining in Nova Scotia has been the lack of continuity of management, and the absence of a competent mind directed through a lifetime of familiarity and research to the solution of the cumulative problem of this unique field. It is one worthy of a life study, and there is no engineering problem down in the Maritime Provinces to be compared to it for difficulty, or for the honours that success would bring.

The Trenton Cuesta

By Watson KIRCONNELL, M.A., Kingston, Ont.

A new cuesta in old Ontario is the thesis of this short article.

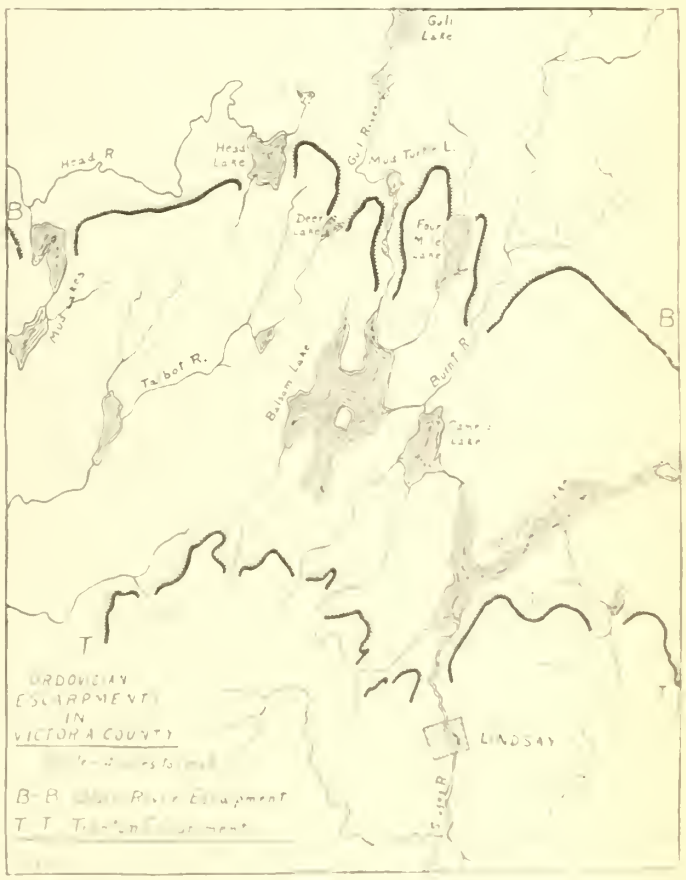
It has long been known that close to the junction of the Archaean oldland and the earliest Ordovician strata a pronounced cuesta with an inface of Black River limestones ran diagonally across central Ontario from Georgian Bay to Kingston. Dr. A. W. G. Wilson has described this Black River escarpment in some detail. (See Trans. Can. Inst., 1900-1, p. 160 and Bulletin, G. S. of A., Vol. 15, pp. 216-226.) But neither he nor Dr. A. W. Graban in his recent article (Geographical Review, April-June 1920, pp. 264-276) make any mention of any cuesta intermediate between the Black River formation and the great Niagara escarpment of Silurian limestones.

Apparently, however, the limited time and extended field of earlier investigators have concealed from them the existence in the southern part of Victoria County of a bold escarpment of Trenton limestone running approximately east and west, from fifteen to twenty miles south of the Black River escarpment. (See Map 1.) The length of this "Trenton escarpment", including its many windings and inversions, is practically sixty miles, within the borders of Victoria; and I have no doubt that in the adjacent counties to east and west it is coextensive with the Trenton limestones which it delimits.

My proof of this cuesta inface dates from September 1920, when I was looking for physiographical corroboration of the history of the "Algonquin" lake and river systems of Pleistocene times. My curiosity was soon inflamed by the unique character of a precipitous limestone cliff, obscured occasionally by glacial drift but often 150 clear feet in height, which ran across country in complete disharmony with any post-glacial drainage system; and I knew no peace of mind until, by walking and cycling, I had followed the escarpment to the limits of the county and established its continuity and identity.

It can be traced best by starting just at the left of the Grand Trunk Railway at Mackenzie's Crossing, four miles north of Lindsay. Here it appears on the Dark farm, crosses the Fenelon Township boundary and then turns west paralleling McLaren's Creek as far as the 2nd Concession of Fenelon. Here the so-called "Fenelon Hill" road is chiselled down the face of the cliff. On Concession II, Fenelon, McLaren's Creek passes out through a wide valley in the escarpment. The latter turns north here and is easily traced as far north as Lot 10, Concession III, where it strikes west until due north of Cambray village. Here great glacial deposits of sand and gravel obliterate it, but it is found again just west of Islay. From Lot 15, Concession I, Fenelon, it cuts across to Lot 7, Concession XI, Eldon, just west of the township boundary, where it shadows the Glenarm road quite prominently. Thence it runs north till a little past Glenarm, then bends around to the west as far as Lot 10, Concession VIII, Eldon, where the C.P.R. passes through it. On Lot 10, Concession VII a creek, tributary to Balsam Lake, passes out through a swampy valley. The cliff next proceeds up the 7th of Eldon as far as Balsam Lake Station, where it forms a very bold bluff before turning on a south-western stretch towards Argyle. At Argyle is another stream valley; but on Lot 11, Concession II, Eldon, the cuesta-front appears again and runs west into Ontario County on the 5th Concession of Thorah.

Every foot of this thirty-five miles of Trenton escarpment, west from the Scugog river to Ontario County, I have explored personally, on foot or by bicycle. East of the Scugog I have not followed it up so carefully; but I have located it at several points as far up as Pigeon Lake and have no doubt that it is practically continuous right across the county. The Scugog flows out through a wide valley; but the cliff reappears on the Brien farm, just north of Tillytown, and runs northeast behind Hay's Point. It is steep here, but not precipitous. Following Sturgeon Lake for some distance, it turns down steeply west of Emily Lake, reappears to the east of Emily Creek, and, after circling north a little, runs down the west shore of Pigeon Lake. Here, on Lot 18, Concession X, Emily, is the last outcropping which I have mapped personally.



The immediate inference from the existence of two clear escarpments in Victoria is that softer strata once intervened between the Black River limestones proper and the Trenton limestones proper. These softer beds were partially eaten away by the erosion of Tertiary times, leaving the imbricating edges of the hardest Trenton rocks as a cliff-front and, in front of this, the "Kawartha lowland" in which the Kawartha lakes, Balsam, Cameron, and Sturgeon, now lie.

It is also instructive to note that both escarpments are pierced by old Tertiary river valleys which maintain their identity through both cuestas and cliffs

the preglacial drainage system mapped out by Dr. Wilson. The most important of these valleys are those by which Gull River and Burnt River now enter the Black River cuesta from the Laurentian peneplain on the north. In both cases, but especially in the former, the old rock walls of the valleys, inverted from the main cuesta-front, can be traced southwards, parallel to the rivers, for several miles. Then, in the Trenton escarpment, on the exact projection of these ancient valleys, we find corresponding openings whereby these consequent streams flowed through towards the south-southwest, ultimately to join the Dundas master-consequent and pass out to the Erie lowlands. The glacial deposits are much heavier on the southern escarpment and the basset walls of its Tertiary valleys are more thickly masked than on the Black River cuesta, yet the unity of the old drainage system is quite clear.

The chief value of the mapping of the new "Trenton Cuesta", apart from the aid given in an imaginary reconstruction of Tertiary physiography, will doubtless be the drawing of a plainer distinction between the Black River and Trenton strata. Heretofore they have often been referred to in a single breath and grouped together as if little discrimination could be made between them. The discovery of a new escarpment, in no way smaller or less striking than that on the Black River frontier, will help to give the Trenton formation an individuality long denied it.

TORONTO NOTES.

In the Annual statement of the McKinley-Darragh-Savage Mines of Cobalt, Limited, which is now being sent out to the shareholders, a net loss of $40,574, as compared with net profits of $354,128 in 1919 are shown. The report points out that at the beginning of the year 1920 the price of silver was $1.31 per ounce, whereas at the close of the year it had fallen to 64¼ cents. As the average cost of producing silver during 1920 amounted to 85½ cents per ounce, the situation changed from one of operating at a substantial profit to one of operating at a steady loss, and on Jan. 1, 1921 it became necessary to close down the plant completely. The report declares it improbable that the ores left in the mine can ever be profitably produced at around the present market price. "The reopening of the mine, then, is conditioned on a real strengthening in the world demand for silver bullion" states the report. It is pointed out that a large tonnage of ore was broken in the mine during the period of high silver-prices, and this ore was profitable at that time. However, with silver around 60 cents per ounce it is unprofitable. The mine has approximately 25,000 tons of ore broken and, while a small portion of it might be profitable at present prices, the bulk would yield very little profit. There is also a considerable tonnage of unbroken ore remaining in the mine. The financial statement gives the current assets as amounting to $2,502,000 as compared with $2,739,864 in 1919. The current liabilities amount to $110,339, as compared with $101,479. Three dividends were paid during the year, amounting to $202,292, and these were of the same proportions as those paid during 1919. During the year a number of small ore-bodies were encountered as a result of development work, and the report states that these should produce a considerable tonnage of ore.

The Moore Filter Company, of New York, has commenced action in the Exchequer Court at Ottawa, against the Nipissing Mining Company of Ontario, claiming damages to the amount of $600,000, together with an injunction to prevent further use of the "Moore Filter," an appliance held to be "especially adapted for the filtration of precious-metal-bearing slimes." In its statement of claim the Moore Filter Company allege that the Nipissing Mining Company has infringed the patent rights to the Moore filter and has wrongfully used the filter in its business. Although thirty days have elapsed since the filing of the statement of claim, an order was made directing the plaintiff to furnish security for the defendant company's costs in the event of failure to succeed, and under this order the defendant company has ten days after service upon it of notice of the furnishing of such security within which to file its statement of defence. It is understood that the Nipissing Company is ready to file its defence and the case will likely go on.

In its allegations the Moore Filter Company claims that Canadian patent 85,610 was issued on December 29, 1903 to George Moore, then resident in Salt Lake City. The patent was for an "improved filter system especially adapted to the filtration of refuse." The patent right of George Moore was assigned to the Moore Filter Company, incorporated under the laws of the State of Maine, but with head office at New York, on April 27, 1907, and the company now claims the sole right to the patent.

It is charged that the Nipissing Mining Company has used and employed a filter system which infringed the patent of the Moore Company, and that although notified the Nipissing Company persisted in the using of such filter.

The Moore Company now claim $600,000 for loss of profits on the operation of the filter, an injunction preventing further infringement and the immediate destruction or delivery of all machines or appliances by which the Moore patent was held to have been infringed. The case is of considerable interest to the mining industry of Ontario.

U.S. GEOLOGICAL SURVEY ISSUES MAP OF OIL AND GAS FIELDS OF KANSAS

The United States Geological Survey, Department of the Interior, has just published a map of the oil and gas fields of Kansas. This map, which is on a scale of 12 miles to the inch, shows not only economic data of special interest to the oil man, but the township net, county boundaries, railroads, drainage lines and principal towns and cities. The oil fields are outlined in green and the gas fields in red, scattered occurrences of oil or of gas that are not of sufficient importance to be classified as fields are plainly indicated, the pipe lines are shown in a distinctive color, the locations of refineries are indicated and the names of the principal fields are given.

This map, which should be of extraordinary value to producers, refiners, and geologists interested in the Kansas fields, was compiled under the direction of G. B. Richardson of the United States Geological Survey, and was made possible by the cooperation of many of the producing companies and geologists whose interests lie in Kansas. The map is sold for 50 cents a copy and may be obtained from the Director of the United States Geological Survey, Washington, D.C.

The Great Fault of the Sudbury Nickel District

By C. H. HITCHCOCK, Sudbury.

The nickel formation (norite) of the Sudbury District is thought to be an intrusive sheet along the contact of the Upper Huronian sediments with the older rocks.

The folding of the district and subsequent erosion has produced an eliptical outcrop of norite, the longer axis being thirty miles long and the shorter axis sixteen miles.

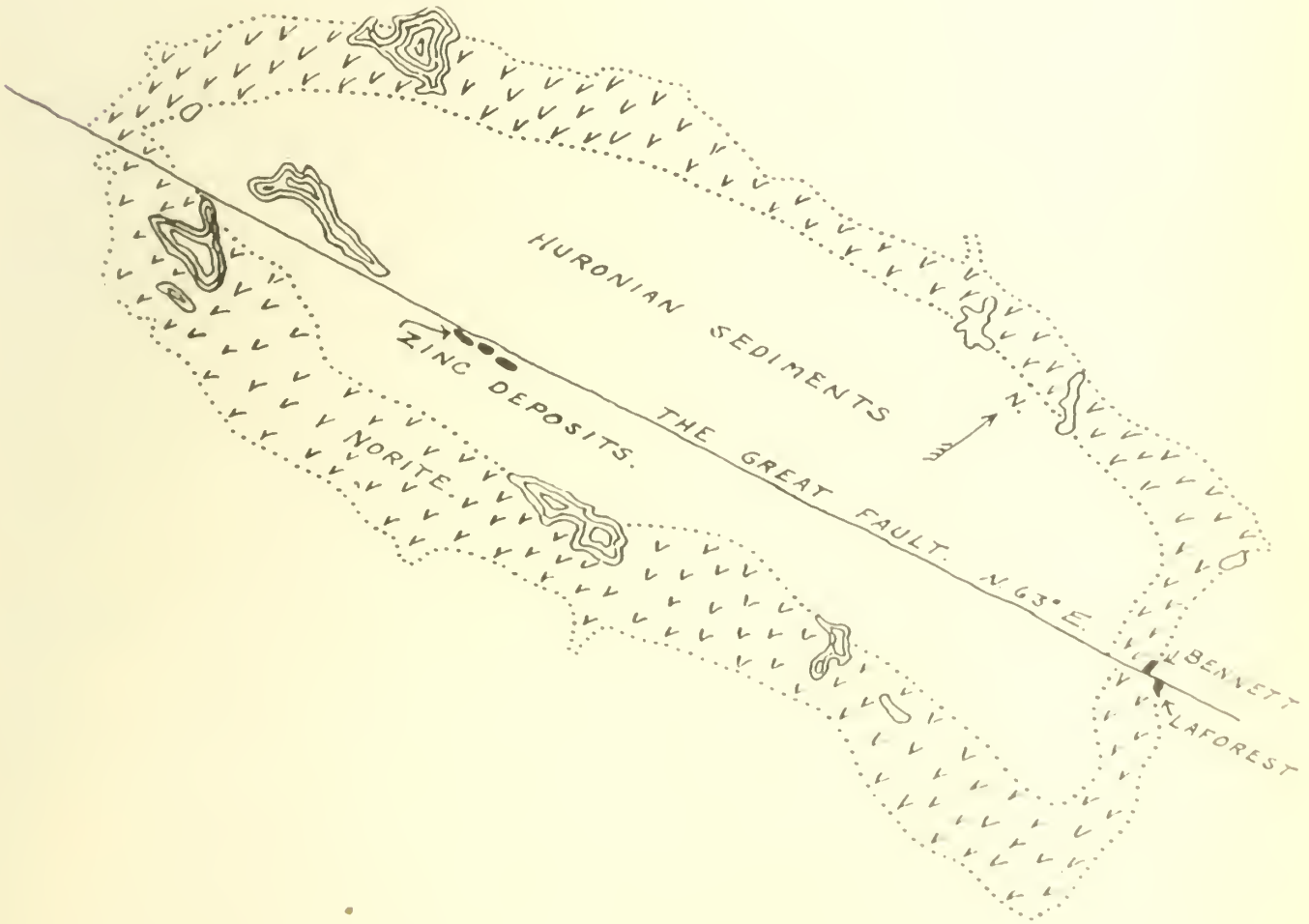
The past mapping has been very general, more so than most people realize. Many faults and hundreds of intrusive dikes have never been mapped at all.

In the southern part of Trill township just north of the Sultana Mine, basic norite rests against acid norite. The nickel formation appears faulted, the displacement amounts to approximately six thousand feet. In line with this fault on the opposite side of the nickel basin, in Capreol township just north of Clear Lake, the norite is faulted again, showing a displacement of two thousand five hundred feet. The Bennett and LaForest prospects are really the same ore zone but have been separated a half mile by the above fault.

As the strike of the fault in both Trill and Capreol townships is the same, namely sixty-three degrees northeast, and the direction of the displacement is the same, it appears very likely that this fault cuts the whole nickel basin for a distance of thirty miles.

An economic item of interest is that the zinc deposits south of Chelmsford are in exact line of this fault. It is possible that these deposits have a genetic relation to the great fault. Much of this fault zone in the center of the nickel basin is soil covered, therefore other zinc deposits may exist and the line of this fault may be a promising zone to prospect.

Although further field work could be done to verify or disprove the existence of this fault, from the observations I have made I believe it is a reality.



Map showing suggested Great Fault in Sudbury Nickel Area.

Northern Ontario Letter

THE SILVER MINES.

The Cobalt District.

Operations in the Cobalt district have narrowed down to approximately one-third the rate which prevailed one year ago. Current production has declined to less than half a million ounces monthly, and the total number of men employed does not exceed 650.

The poor market for silver is the great factor which has upset the equilibrium, and for the time being is almost wiping out an important industry. This factor is intensified by reason of the fact that the workers in the mines have not established as high efficiency as prevailed before the war, and in being unable to turn out an equal tonnage they are making it more difficult for the mines to continue operation.

Official announcement is made to the correspondent of the Journal that the Mining Corporation, which closed its mines and mills March 7th, will carry on certain repair work in its mill, and, by making certain alterations and the expenditure of about $20,000 will increase its milling facilities to 300 tons daily as compared with 200 tons formerly. Should the market for silver strengthen, the company will be in a position to resume work within the next two months and at a rate which holds out promise of reducing the cost of producing the metal. Among other things, it is planned to centralize underground work as much as possible. In doing this, instead of drawing ore from widely separated points, the Buffalo part of the property will be drawn from more extensively. The arrangements to draw ore from this property were completed just prior to closing down. The company has passed up its dividend for the first quarter of 1921, the object being to conserve finances for the time being.

In an official statement just obtained from the Aladdin-Cobalt, which controls the Chambers-Ferland mine, the reports recently presented in the Journal in regard to developments at the 410-ft. level are fully corroborated. Very rich ore has been encountered, some sections of the vein containing upwards of 10,000 ounces of silver to the ton. The general average of the 2-inch vein is around 5,000 ounces to the ton, while the wall-rock contains a quite large tonnage of ore which will run 100 ounces to the ton. The development is regarded as being important.

Announcement is made that the Moore Filter interests, of New York, are suing the Nipissing Mining Company for alleged infringement of the Moore Filtration Process, the figure set in the damage action being $600,000. Officials of the company preferred to not discuss the matter, with the exception of declaring that the whole question is in the hands of the Company's Toronto solicitors.

F. J. Bourne, manager, and Mr. Holmes, mill superintendent, have resigned from their positions with the Bailey Silver Mines, the resignations having been accepted as going into effect March 31st. It is learned that G. C. Bateman will be consulting engineer from that date forward and will have full charge of mining and milling operations. Mr. Bateman will continue to manage the La Rose.

Concerning a deal reported in certain sections of the press that the La Rose and Bailey Silver Mines were negotiating with a view to selling the Bailey mill to the La Rose has been emphatically denied by an official of the Bailey Silver Mines who gave the Journal correspondent authority to state that no such deal is pending and that the matter has not even been discussed in official circles.

It has just been learned that a hitch has occurred in the deal between the Aladdin-Cobalt and some of the interests identified with the Northern Customs Concentrator. It will be recalled that last year, these interests purchased for something like $175,000 a part of the Chambers-Ferland mine which is owned by the Aladdin-Cobalt. It now turns out that about $70,000 has been paid on the deal, but that the balance has not, and the property reverts back to the Aladdin-Cobalt. It is understood the latter company also retains the $70,000 received on account, as and for liquidated damages.

In his regular monthly report to the president and directors of the Nipissing Mining Co., Hugh Park, manager, states that during the month of February the Company mined ore of an estimated net value of $124,391, (which included $12,460 worth of cobalt) and shipped bullion from Nipissing and custom ores of an estimated net value of $234,374. The value of the silver produced was estimated at 54⅜ cents an ounce.

"There were no developments of an unusual nature during the month, says Mr. Park. Vein 241, found in January at the second level of 63 shaft, has received a small amount of drifting and results have been encouraging to date. The vein is averaging 1,200 ounces to the ton over a width of two inches.

"The low-grade mill treated 6,289 tons. The high-grade plant treated 149 tons. The refinery shipped 401,111 fine ounces of bullion.

Prospectors classes are being held in the mining building of the Haileybury High School, and the attendance is stated to be upwards of thirty at the time of writing. The course covers a period of only ten days, and will be concluded March 18th, according to present plans.

The annual report of the McKinley-Darragh mine has just been issued, and shows a net loss of upwards of $40,000. The statement declares it quite impossible to re-open the mine under present conditions. Costs last year approximated 85½ cents an ounce, a fact which makes it clear that operations could not be carried on this year with silver well below 60 cents an ounce. Dividends paid last year were taken out of the former surplus, according to the report, a fact which came as quite a surprise as it had been believed the company was making substantial profits during the first half of the year at least.

Ore and Bullion Shipments.

During the week ended March 11th, the La Rose Consolidated was the only company to ship ore from Cobalt, this company sending out one car containing approximately 69,126 pounds of ore.

During the corresponding period, the Nipissing made two shipments of bullion, one of 69 and one of 77 bars and amounting to a total of 146 bars containing 189,491 ounces of silver.

THE GOLD MINES.

The Porcupine District.

Although reports are current that the Northern Canada Power Company plans to take adequate steps to meet the future hydro-electric power requirements of the mines of the Porcupine district, yet nothing has been ascertained in official circles in regard to this important matter. It is believed no difficulty will be experienced once the spring break-up occurs, and throughout the Summer, but those who are vitally in-

volved in the big mining operations are anxious to learn to what extent the possibilities of recurrences of periods of power shortage during the winter months may be minimized. The experience of the past few months has been extremely costly, and the hope is expressed that everything possible will be done to prevent a repetition of such an unfortunate situation.

A. F. Brigham, general manager of the Hollinger Consolidated, told the correspondent of the Journal that his company is receiving about 1,500 K.W.s as compared with full requirements of close to 10,000. By utilizing auxiliary equipment which is costing the company from $800 to $900 a day to operate, an average of about 1,300 tons of ore is being treated daily. The Hollinger claims to have an agreement whereby the power company agrees to supply the full requirements of the mine, and in view of the present shortage, the Hollinger is taking action against the power company for damages. It is not known whether the difficulty may be adjusted before being brought to trial, or not.

A meeting of the directors of the Dome Mine is to be held this week, when it is understood the usual dividend of 2½ p.c. will be declared for the second quarter of the year. The question of distributing some of the surplus as a "capital reduction" is expected to be left over for a few weeks, and may be dealt with soon after the spring break-up by which time the mines and mill will be in full operation, a condition which will permit the directors to estimate with greater accuracy the extent of the distribution that may safely be made. It is generally believed the capital reduction this year will amount to about 20 p.c., in addition to the regular dividends of 10 p.c. This total return of 30 p.c., if actually decided upon, would represent a return of 10 p.c. on the shares at $30 each as compared with their par value of $10 each. It is learned that the big underground crusher at the 850 ft. level is now in operation, and no difficulty is expected to be encountered in feeding the mill at full capacity just as soon as the necessary power becomes available.

During 1920, the Davidson Consolidated treated 3,003 tons of ore from which a total of $11,210 was produced, or an average of $3.73 per ton. Current expenses were obviously greatly in excess of the value produced at such times as the small mill was operated. It is believed, however, that if present plans materialize in the Old Country, and with a cyanide plant installed, the value per ton recovered may be much higher. Messrs. E. C. and H. H. Sutherland of Toronto are at present in England in connection with the deal which is pending in connection with the sale of the Davidson Consolidated to English interests.

Kirkland Lake District

Official figures show the Kirkland Lake Gold Mines, Ltd. treated a total of approximately 40,812 tons of ore during 1920, and recovered $285,170. This shows an average of 112 tons daily and an average recovery of close to $7 per ton. No figures have been secured in regard to the cost of work, but from statements made from time to time during the year by officials, it is believed the average cost was held down to about the average grade of the ore. It is also understood the current year is to witness an increase in mill heads as well as an increase to close to 150 tons daily in which case the year 1921 offers promise of substantial net earnings. Developments at depth continue favorable.

It is intimated in official circles that the Ontario Government will spend considerable money this spring and summer on the work of improving the road through Lebel township from the Tough-Oakes mine. This work will be preliminary to macadamizing the three or four mile stretch as far east as Mud Lake during the following summer, provided the result of exploration and development work in that area proves to be satisfactory. At present good headway is being made on the various prospects, and with interest turning strongly in favor of gold mining a very active summer is looked for in this district.

About eight miles farther east from Mud Lake, the Argonaut Gold Mines continues to make good progress in its work. Last year, by operating a small straight-amalgamation mill on ore taken out during the course of development work, the company treated 4,637 tons of ore and recovered $26,678.25. This assisted to defray the cost of the large amount of exploration and development work done during the year. Average recovery being $5.75 per ton of ore treated by this process indicates a probable recovery of around $10 a ton just as soon as the property can be equipped with a modern mill.

Concerning the controversy between certain minority shareholders and the officers of the Goldfields, Ltd., of Larder Lake, it is understood an effort is being made to enlarge the case. As stated previously in the Journal, an injunction restraining the directors from carrying out a proposed deal with the Canadian Associated Goldfields, was refused on the grounds that not sufficient evidence was produced.

In the meantime, work on the Associated Goldfields' property is progressing at a good rate under the management of Mr. Gray, formerly of the staff of the Dome Mines and it is understood the efficiency of the work is improving.

A paper read by W. E. Simpson, of the Miller Independence Mines, at the Annual Meeting of the Canadian Institute of Mining & Metallurgy, has caused considerable discussion in the mining districts. The paper dealt with the need of public ore treatment plants at points of vantage in the mining districts, and also dealt with the ease with which patents are secured upon mining claims and the large amount of territory lying in idleness. Comment heard in the mining districts is generally favorable to the points brought out, one writer from as far as west as Schreiber pointing out that in his district the ideas expressed by Mr. Simpson covered the situation exactly as it exists.

PROGRESS OF MINING IN ALASKA.

To provide fuel for the use of the Alaskan Engineering Commission coal mining was continued in 1919 in the Matanuska field, Alaska, on about the same scale as in previous years. Near this field and also tributary to the Government railroad, is the Willow Creek gold district, where large auriferous lodes are being exploited. These mining developments are described in a pamphlet by Theodore Chapin entitled "Mining in the Matanuska Coal Fields and the Willow Creek District, Alaska," just issued by the U.S. Geological Survey, Department of the Interior, as Bulletin 714-D.

The copper mines of the Chitina Valley are the largest and richest thus far developed in Alaska. Their successful development has been made possible by the completion of the Copper River & Northwestern Railroad, which affords transportation to tidewater. The recent mining progress in this district is shown in a report entitled "Mining in the Chitina Valley, Alaska," by F. H. Moffit, issued by the United States Geological Survey, Department of the Interior as Bulletin 714-D.

TORONTO MINING STOCK QUOTATIONS.

Quotations on Active Stocks on Standard Stock Exchange for week ending March 12th 1921:

	High	Low	Last
SILVER			
Adanac Silver Mines, Ltd.	1¾	1⅝	1⅝
Bailey	3¾	3½	3½
Beaver Consolidated	39	38	38
Chambers-Ferland	7	6	7
Coniagas	2.00	2.00	2.00
Crown Reserve	16	16	16
Gifford	1⅛	1	1⅛
Hargraves	1½	1½	1⅜
La Rose	24	21	21
McKin.-Dar. Savage	28	20	20
Mining Corp. of Can.	1.05	.77	.95
Nipissing	8.75	8.40	8.60
Ophir	1½	1½	1½
Peterson Lake	9½	9	9
Temiskaming	25	24¾	24¾
Trethewey	16	15	15¾
GOLD			
Apex	2	1¾	1¾
Atlas	20	19	19
Argonaut Gold	35	35	35
Boston Creek Mines	10	10	10
Dome Extension	60	53	53
Dome Lake	3¼	3¼	3¼
Dome Mines	17.95	17.25	17.25
Gold Reef	4	3⅞	3⅞
Hollinger Cons.	6.70	6.55	6.64
Hunton Kirkl'd G. M.	9½	9	9
Keora	18½	16¾	18
Kirkland Lake	50	49	49½
La Palme	5½	5	5½
Lake Shore M. Ltd.	1.17	1.16	1.16
McIntyre	1.99	1.95	1.95
Moneta	11¼	11	11
Newray Mines, Ltd.	7	6	7
Porcupine Crown	21¾	20	20
Porcupine Imperial	⅜	⅜	⅜
Porcupine V. N. T.	19½	19	19
Preston East Dome	3½	3½	3½
Schumacker	25	24	25
Skead	53	50	52
Teck-Hughes	10	9½	9¾
Thompson Krist	7¼	7	7¼
West Dome	7¼	6	6
West Tree Mines Ltd.	5	3¼	4
OILS			
Eureka	15	15	15
Rockwood Oil, Gas	2	1¾	1¾
Vacuum G.	16	14½	14½

MONTREAL METAL QUOTATIONS.

Following are fair average prices for ingot metals (in less than car-load lots) at Montreal:

	Mar. 9	Mar. 16
Copper, Electro	17½	17¼
Copper, Casting	17¼	17
Tin	36	35½
Lead	6	6
Zinc	7¼	7¼
Aluminum	33	33
Antimony	7¾	7¼

TORONTO COAL PRICES.

Toronto, March, 17.—Coal market conditions are unchanged and little coal is moving. Demand continues light. Bituminous prices are for lump $2.85 on Ohio to $3 to $3.25 on Pittsburg and $3.50 on Youghioghney and West Moreland. Smokeless is quoted at $8.25 to $8.50, mine run and lump. Stove and nut are quoted at $8 net and egg at $7.50 net, while pea coal is selling at $6.25, mine prices, American funds.

TORONTO METAL QUOTATIONS.

	March 17
Copper, electro	18
Copper, casting	17¾
Tin	39
Lead	6½
Zinc	7¾
Aluminum	31
Antimony	8

SKINNERS MINING MANUAL FOR 1921.

The "Mining Manual and Mining Year Book" for 1921 (Thirty-fifth annual issue) by Walter R. Skinner, editor of the "Oil & Petroleum Manual" has just been issued. Price 20s., net 21s. post free inland and 21s. 6 post free abroad. This reference work is the only annual book published dealing with mining and kindred companies operating in all parts of the world. This years issue contains full particulars of 1430 mining companies — gold, diamond, silver, copper, tin, iron and coal also exploration and mining investment companies arranged in alphabetical order. The Particulars given of each Company include the Directors and other officials, date of establishment, seat of operations, description of the property, with the purchase consideration, plant erected or in course of erection, present working results, ore reserves, details of capital, calls, dividends paid, and the financial position as disclosed by the latest accounts. Highest and lowest prices of the shares or the last three years, also latest price. Lists are also given of the officials, connected with the companies and comprise 3,530 Directors and 952 mining and consulting engineers, their addresses and the names of the companies with which they are connected. Other useful features of the book are the Supplementary Index of private dormant or Companies which have ceased to be of public or market interest; Crushing Tables and Outputs from the principal Gold mines showing tons treated monthly, results obtained, and yield per ton; also annual yields and Dictionary of Mining Terms by the use of which mining developments can easily be followed. A Directory of Manufacturers and Exporters of Mining Machinery is also included. The book can be obtained from all Booksellers, or direct from the Publishers, Walter R. Skinner, 11-12 Clements Lane, London, E.C., 4 and "Financial Times", 72, Coleman Street, London, E.C., 2.

We are glad to note that Mr. Skinner's Manual contains much more detailed information regarding Canadian mining companies than previous editions. There is a tendency to omit Canadian mining companies from directories and other compilations issued in London, because so many Canadian companies are financed and controlled from New York. We would suggest in future editions of this very trustworthy manual statistics regarding Canadian gold production, and mention of our asbestos companies. The attention paid by English capitalists to some very important Canadian resources is quite overshadowed by United States connections.

C. I. M. & M. Montreal Meeting

April 2nd and 4th, 1921

List of Registrants

W. F. Ferrier, Toronto
Jas. McEvoy, Toronto
W. L. Dethloff, Coniston
G. R. Southee, Montreal
W. M. Goodwin, Kingston
Jas. Patk. MacGregor, Toronto
Thos. B. Caldwell, Perth
W. G. Miller, Toronto
John McLeish, Ottawa
Theo. C. Denis, Quebec
Geo. D. Macdougall, New Glasgow
W. K. McNeill, Toronto
Geo. C. Riley, Montreal
W. E. Segsworth, Toronto
T. L. Walker, Toronto
Alfred C. Lane, Cambridge, Mass.
J. MacDonald, Sherbrooke
O. E. S. Whiteside, Coleman
Edward H. Robie, New York City
B. F. Haanel, Ottawa
W. B. Timin, Ottawa
Arthur Brisson, Ottawa
A. M. Campbell, Ottawa
Douglas A. Mutch, St. Catherines
F. L. James, Tillsonburg
Alexander MacLean, Toronto
J. S. DeLury, Winnipeg
H. Foster Bain, Washington
Geo. S. Cowie, Soo, Mich.
L. D. Couper, Minneapolis
J. F. Black, Sudbury
Geo. B. Nisbet, Erie, Penna.
O. H. Hugill, Soo, Ont.
J. F. Robertson, Coniston
C. V. Corless, Coniston
Robt. A. Bryce, Toronto
J. C. Behlelman, Montreal
A. C. T. Sheppard, Ottawa
L. G. Wheaton, Montreal
Geo. E. Cole, Ottawa
Norman R. Fisher, Thetford Mines
B. Neilly, Toronto
L. H. Cole, Ottawa
Louis Simpson, Ottawa
J. L. Agnew, Copper Cliff
E. Hibbert, Nickelton
A. W. G. Wilson, Ottawa
R. E. Hore, Toronto, and Mrs. Hore
A. O. Dufresne, Quebec
C. E. MacDonald, Toronto
H. J. MacKenzie, Butte, Mont.
J. W. Davis, Montreal
H. J. Stewart, Timmins
Horace F. Strong, Haileybury
R. J. Forrest, Westmount
James G. Parmelee, New York City
C. W. Cushman, Weedon
P. Kirkegaard, Toronto
Chas. Spearman, Montreal
John A. Dresser, Montreal
E. B. Tilt, Montreal
W. Peck, Montreal
C. H. Buskard, Deloro
Fred. Paquet, Deloro
Thos. W. Gibson, Toronto
W. E. Simpson, Boston Creek
C. L. Drury, Toronto
R. A. Elliott, Deloro
J. W. Evans, Belleville
R. Graham, Montreal
J. H. Stovel, Minneapolis
C. W. Knight, Toronto
Ralph A. Meyer, Vancouver
John W. Bell, Montreal
K. I. Simpson, Boston Creek

Some of those who attended the Annual Meeting at Montreal (Photographed on the steps of St. James Cathedral.)

W. C. V. Corless, the newly elected President, is marked by a cross. Immediately to the right is M. Edwin Ludlow, President of the A. I. M. & M. E., and just behind Mr. Corless is Colonel A. S. Dwight, Mr. H. Foster Bain, the Director of the U. S. Bureau of Mines is behind and between Mr. Ludlow and Mr. O. E. S. Whiteside, the Retiring President. A list of registrants, most of whom are to be seen in this group, is published elsewhere in this issue.

Marie MacDonald, Sherbrooke
J. Austen Bancroft, Montreal
J. B. Porter, Montreal
W. G. Mitchell, Montreal
J. G. Ross, Montreal
R. R. Rose, Montreal
Mrs. Alfred Stansfield, Montreal
Norman M. Campbell, Montreal
G. E. Silvester, Toronto
Alfred Stansfield, Montreal
H. A. Stevens, Bruce Mines
Arthur A. Cole, Cobalt
Stopford Brunton, Montreal
C. H. Poirier, New York City
H. Park, Cobalt
Samuel N. Cohen, Montreal
E. R. Faribault, Ottawa
Chas. Camsell, Ottawa
Ernest W. Monk, Montreal
G. A. Young, Ottawa
W. Malcolm, Ottawa
E P. Matthewson, New York City
H. Frechette, Ottawa
M. F. Bancroft, Ottawa
V. Dolmage, Ottawa
Mrs. R. F. Segsworth, Toronto
J. C. Kemp, Montreal
M. E. Wilson, Ottawa
Geo E. Leighton, Montreal
H. C. Cooke, Ottawa
Q. J. Maltby, Montreal
H. B. Willmott, Montreal
G. E. Sancton, Montreal
G. M. Thomson, Ottawa
Frank D. Adams, Montreal
T. L. MacCallum, Montreal
M. B. Nesbitt, Montreal
D. R. Morrison, Montreal
E. Justin Murphy, Montreal
Samuel Davis, Montreal
C. L. Dewar, Montreal
H. L. Humes, Montreal
Jas. B. Brow, Montreal
John Wightman, Montreal
L S. Weldon, Montreal
H. R. Bissell, Montreal
T. H. Weldon, Montreal
D. G. Kyle, Montreal
S. H. Davis, Montreal
Paul S. Scott, Montreal
E. H. Wait, Montreal
J. S. Godard, Montreal
J. M. Wilson, Montreal
W. H. Collins, Ottawa
W. Tansley, Montreal
H. Roy Cromwell, Montreal
Edgar C. Duff, Montreal
A. R. Lawrence, Montreal
P. D. F. Hamilton, Montreal
W. Ray McClelland, Montreal
M. R. Wells, Montreal
G. V. Douglas, Montreal
J. E. Saunders, Montreal
Robt. A. A Johnston, Ottawa
C. C. Hoyt, Montreal
C. G. Ross, Montreal
N. V. Porritt, Montreal
S. J. Macdonald, Montreal
F. W. Gray, Ste. Anne de Bellevue
J B. Mawdsley, Montreal
W. A. Coughlan, Soo, Ont.
John E. Hardman, Montreal
D. B. Dowling, Ottawa
L. B. Rochester, Montreal
K. G. Chipman, Ottawa
F. W. Scriver, Montreal
J. E. Gill, Montreal
H. G. Young, Cobalt
John M. Macoun, Ottawa
M. C. Coll McFee, Montreal
C. L. Palmer, Montreal
A. W. Carlyle, Montreal
Gordon McT. Pyke, Montreal
H. S. Jordan, Montreal
W. C. Greenough, Montreal
J. Stevenson Brown, Montreal
J. C. Nutter, Lennoxville
J. S. Buchan, Montreal
Geo. S. Hume, Montreal
Hugh S. Spence, Ottawa
M. B. Baker, Kingston
E. J. Carlyle, Sudbury
E. V. Ells, Ottawa
A. O. Hayes, Calgary
H. V. Haight, Sherbrooke
G. C. Bateman, Cobalt
E. A. Collins, Copper Cliff
E. Thomson, Toronto
A. L. Parsons, Toronto
Geo. A. Guess, Toronto
W. A. P. Schorman, Toronto
E. T. Corkill, Copper Cliff
W. P. Alderson, Perth.
John W. Shaw, New Liskeard
J. G. Morrow, Hamilton
S. J. Cook, Ottawa
John Mack, Lethbridge
F. M. Smith, Kingston
Edwin Ludlow, New York
J. Ness, Toronto
D. G. H. Might, London, England
E. L. Bruce, Kingston
A. Ferland, Haileybury
F. J. Ellis, Kingston
J. W. Dougherty, Kingston
J. D. Calvin, Montreal
O. N. Scott, Toronto
J. J. Penhale, Sherbrooke
Peter B. Jue, Montreal
M. B. Fairlie, Cobalt
Stanley N. Graham, Kingston
Charles Fergie, Montreal
G. J. MacKay, Kingston
I. M. Marshall, Kingston
Arthur S. Dwight New York
T. E. Godson, Toronto
A. G. Munich, Montreal
E. M. Kindle, Ottawa
Lt.-Col. Owen-James, London, Eng.
P. McN. Bennie, Belleville
L. L. Bolton, Ottawa
H. L. Forbes, Ottawa
V. L. Eardley-Wilmott, Ottawa
Bertwell C. Root, Westmount
R. O. Sweezey, Montreal
G. W. Bain, Montreal
D. R. Harrison, Montreal
J. E. Buchanan, Montreal
B. G. Clark, Montreal
M. A. Wolfhill, Montreal
G. H. Dickson, Cobalt
W. S. Rugh, Montreal
A. W. McMaster, Sydney
I. Pevgner, Montreal
S. H. Davis, Montreal
J. J. Humphrys, Montreal
G. M. Edwards, Ottawa
W. Erlenborne, Montreal
J. H. Rattray, Cobalt
Guy Tombs, Montreal
Fraser S. Keith, Montreal
G. M. Clayton, San Francisco
H. H. Claudet, Ottawa
W. H. DeBlois, Sulphide
H. E. T. Haultain, Toronto
W W. Fowler, Montreal
Bradley S. Carr, Chicago, Ill.
Alex. H. Smith, Huberdeau
J. A. Campbell, The Pas
S. H. Davis, Montreal
E. W. Farwell, Sherbrooke
E. Godfrey, Montreal
S. J. Fitzgerald, Thetford Mines

British Columbia Letter

THE METAL MINES.

Stewart, B.C.

The last shipment of 600 tons of ore from the Premier Mine, Salmon River, was brought over the snow in five days. Several shipments are expected to be added to what has been brought out before the winter trail breaks. Preparations still are underway for the installation of an aerial tramway, the work on which will commence as soon as the summer season opens.

Dawson, Y.T.

A placer mining claim situated on Crofton Gulch, Y. T., to which the Canadian Klondyke Company asserted ownership, has been pronounced the property of Mrs. Boyle by the Court of Appeal of Canada. Twenty years ago a concession was granted in the territory in which the claim is situated. The original holder of the concession was Col. Boyle. The placer claim was kept in good standing until 1920 when it was permitted to lapse. It then was re-staked by Mrs. Boyle. The legal point at issue was whether it then reverted to the Crown or to the Klondyke Company, which had acquired the Boyle Concession. If to the Crown, Mrs. Boyle's position is sound, and officials must accept her application for record. The Courts having so decided the astute lady is in possession.

Trail, B.C.

Receipts of the Trail Smelter, Canadian Consolidated Mining and Smelting Co. for the week ending February 21, were 8,665 tons of ore and concentrates, of which all but 100 tons come from Company properties. The Horn Silver Mine, Similkameen, accounted for 95 tons of the latter amount. The Nip and Tuck, Sandon, made a trial shipment. For the year up to date, the shipments at the smelter aggregate 58,145 tons, of which the Company's mine have contributed 57,084 tons. It, therefore, is clear that the independent operators of the interior of the Province have not been doing much as yet this year.

Nelson, B.C.

Discussing operations on the property of the Silversmith Mines, Ltd., old "Slocan Star", Slocan, B. C., John B. White, the president, explained that a policy of development and preparing for shipment when market conditions improve is being followed. Forty men are working underground and are developing and blocking out a large body of ore by means of drifts and

raises on the various levels. Further depth also is being sought on a minor ore-body. This is situated near where the new workings take off from the form a long crossent, now used as the working tunnel. Other work consists of driving under the old workings for the ore body previously mined above. When ore is encountered in the course of development, it is removed and stored, but otherwise there is no stoping. Mr. White emphatically declares that it is not the intention to run the Mill or to ship ore on the present market, "for at present prices we cannot operate our property on a sufficient profit to warrant taking out the ore."

Vancouver, B.C.

The commencement of work on a large steel plant is likely to start in British Columbia this summer according to H. H. Falconer, president of the Manufacturers' Association of the Province. He states that five representatives of the biggest steel operators of Great Britain recently returned to England satisfied that the Province possesses the iron ore and other resources necessary to assure the economical manufacture of iron and steel and that the market for the products is available. Within a radius of 100 miles in the interior of the Province, it is stated, all the necessary varieties of ore were located and examined. The iron plant, therefore, is to be situated in the interior and the steel mill on the coast. Mr. Falconer states that a proposed agreement has been submitted to the Provincial Government dealing with the provincial bounty, taxation, and other questions. If this is accepted by the Government, it is stated that the needed capital is ready for the investment.

J. J. Dickenson, manager of the Blue Diamond Mine, Cobalt, and G. H. Eaton, manager of the Coalspur Mines, Alberta, have been visiting British Columbia. They have been inspecting a number of metal and coal mines and, it is assumed, are looking over the western field generally with a view to locating promising investments.

A plant will be installed about two miles from Quesnel, B. C., for the extraction of platinum and gold from black sands, if the plans of S. J. Marsh reach fruition. Mr Marsh is the inventor of the method of extraction referred to and has been able to convince many practical mining men of the effectiveness of his patent. Himself an old prospector and a first class chemist, and having devoted years to experimentation on these sands, it is not unreasonable to believe that he has devised an economical means of recovering the values which long have been known to be contained in the placer ground of the Fraser River and some of its tributaries. Therefore the results of his work, to be tested soon on a commercial scale, are being awaited with interest.

THE KLONDYKE.

With the famous old placer creeks of Bonanza, Eldorado and Hunker having been practically dredged out the largest remaining dredge propositions in the Klondike proper, that is, within a radius of 50 miles of Dawson, are those of the North West Corporation and the Canadian Klondike Company, allied under the Granville Mining Company, which holds most of the stock of the two operating companies.

The North West Corporation operates in the Indian River watershed, while the Canadian Klondike Company is confined to the Klondike valley. Both are supplied with power from the large hydro-electric plant of the Canadian Klondike Power Company, situated at Glenboyle, 25 miles from Dawson, where the power is generated with water from the Klondike.

The North West Corporation owns two large dredges, one of the Marion and the other of the Bucyrus type. Each has seven and a half cubic foot buckets, with a capacity of 4,000 cubic yards daily. No. 1 dredge of this Company was installed during the early part of 1920 on upper Dominion Creek, and began operations there last summer. It formerly operated on the old Bear Concession, and later on upper Hunker Creek, under the Canadian Klondike Company and was the pioneer modern dredge of the Klondike camp. In its operations last summer, after being moved to Dominion, it met with decided success, and the outlook for it is considered very promising, as Dominion is one of the best of the famous old placer creeks of the Klondike camp yet undredged.

The second dredge of the North West Corporation was bought during the year from the Yukon Gold Company, and is being moved by sleighs from 60 miles below Hunker, where the Yukon Gold finished dredging out its Hunker Creek holdings, to Granville, on Lower Dominion Creek, where it will be assembled this year. It is the intention of the company to start operations there with the dredge as early as possible this season. The company has been preparing ground in this locality by stripping the overburden with hydraulics and by ground sluicing for years, and has a large area ready for work.

The Canadian Klondike Company has three mammoth Marion dredges, the largest in the entire North, and ranking among the largest gold-dredges in the world. They are located on the Company's ground, known as the Boyle concession, extending the full width of the Klondike valley, and from the mouth of Bonanza creek to near the mouth of Hunker creek, some eight miles in length. A large portion of this wonderful deposit of auriferous gravel has been turned over by the dredges of the company during the last several years, but the greater part of the concession is yet unworked, and some estimate it will require fully twenty years to work it out with the large dredges now there. Two of the dredges were working during the last season, 1920, and turned over a large yardage. The third dredge was idle because of not having been fully equipped with buckets and other parts, which were scarce and difficult to obtain during the war. Each of these large dredges has buckets with capacity of 17 cu. ft. and the daily capacity of each dredge is 10,000 to 16,000 cubic yards.

The Canadian Klondike Power Company's plant has two 3,000 K.V.A. generators with a total capacity of 8,000 horsepower, and has been generating about 3,000 horsepower during the summer. The plant operates the year round and supplies power to the city of Dawson as well as to mining operations in the creeks.

The North West and the Canadian Klondike companies employ about 250 men in the busy season of the year, and about 75 during the winter. A fine, large and fully equipped machine shop, located at the mouth of Bear Creek, eight miles from Dawson, does the repair work.

The North West Corporation has extensive placer holdings on Dominion Creek, Indian River, Quartz Creek and Sulphur Creek. It owns most of lower Sulphur. The dredging ground of that company and others

on Sulphur is estimated to be fifteen miles in length, while ground on Dominion suitable for dredging is estimated also at 15 miles, while Quartz has a mile and a half of dredging ground, and Indian River, for 20 miles, is supposed to contain much ground which with new processes will prove in time suitable for dredging. All told, it is estimated the North West and the Canadian Klondike companies have ground enough in sight of dredging value to keep their present dredges and probably others busy the next twenty years. F. P. Burrall is manager of the two companies.

THE COLLIERIES.

The Coal Inquiry ordered by the Government of British Columbia has been in progress a week without any disclosures of consequence. Commissioner A. Henderson has had the dealers of Vancouver City before him. They have told of the cost of handling the coal from the bunkers of the Collieries to the cellars of the consumers. Their profits, it has been testified, amount to 66 cents a ton. No testimony, apart from that of Moses Cotsworth, statistician, has been volunteered by the general public. The latter submitted figures based on records, he stated, and drawing attention particularly to the rise in the retail quotations on coal with the removal of Dominion Government control after the war and also essaying to establish that there has been a disproportionate rise in the cost of coal as compared to the advance in miners' wages. The commission has not yet taken up the matter of the collieries' costs. The feature thus far is the apparent indifference of the general public, the sessions held having failed to attract audiences.

The old question of settlers' rights to the coal underlying property within the Esquimalt & Nanaimo Ry. Belt, Vancouver Island, has again been raised. A deputation consisting of well-known residents of Nanaimo, Ladysmith, and neighboring districts, recently waited on the Provincial Government to ask for the re-introduction to the Provincial Legislature of the Settlers' Rights Act. The situation now is that the last Act of the kind was not signed by the Lieutenant Governor. Under the circumstances it is doubtful whether the settlers' request will be granted. The Act which remains inoperative provides additional time for the settlers to record their claim to coal rights and for the hearing of the same. If such claims are established before the Lieut-Governor-in-Council provincial leases to the coal are granted.

A considerable reduction in the wages of coal miners in the State of Washington has been announced. In all the mines, with two exceptions, there will be a cut of an average of an average of 23 per cent effective March 15 and the retail prices of coal will drop from fifty cents to $2.50 per ton. The two mines unaffected are engaged in the mining of coal for railroads. Between 3,000 and 4,000 men are affected by the order of the operators who explain that they are returning to the wage scale of October, 1919. They state that, if the order is not accepted, the mines will be closed. The executive board of the United Mine Workers of America, District No. 10, is considering the situation

EDITORIAL

Pan Extension Gold Mine

At the Institute meeting in Montreal, Mr. P. T. MacGregor of Toronto, spoke lucidly and convincingly in favor of "blue-sky legislation", and elicited from a well-known member of the Institute the penetrating observation that such legislation was not so desirable for the protection of the "sucker", because in the nature of things that credulous type cannot be altogether protected, but to protect the good repute of mining engineers. As an example of the type of mining promotion it was desirable to discourage, there was displayed a full-page advertisement of a stock offering in the Pan Extension Gold Mine, Rice Lake, Manitoba. In reporting the proceedings at this meeting, this journal did not consider it proper to publish the name of this flotation, it not having come under personal observation in the daily press of the East. In the "Montreal Star" of 16th March, however, and in one later issue, there appeared a full-page advertisement of the Northern Finance Company offering Pan Extension stock at fifty cents a share, this stock being, according to the advertisement, "in demand across the Continent." "As development progresses with the phenomenal showings in the mine, this stock", proceeds the advertisement, "should eventually advance to five dollars or ten dollars a share, as has been the case in other high-grade bonanza mines." "It is", the public is informed, "only a question of time and development." We beg to differ. It is a question of whether the ore is present in sufficient quantity in the property, and the "facts" disclosed do not make this convincingly clear.

Some typical "facts" may be quoted. Rice Lake is declared to be "The richest gold camp in the world." The face of the drift at the 120 ft. level "is considered one of the richest bodies of gold ore ever discovered. There is every assurance that the deeper development will block out millions of dollars of this extraordinary high-grade ore." "Pan Extension is the Leader in a great new gold camp. The drills are pounding away. Every shot a revelation of greater riches, and it looks as though Pan Extension will stand supreme as the richest gold mine in the World."

The advertisement contains the familiar offer of shares at a low price, after which "they will positively be advanced." There is nothing new or original in the literature, and we have seen this kind of thing more cleverly done.

There is not even missing the old gag about purchasers of shares in mining enterprises reaping rich returns, but for real touches of the promoter's humour we much prefer the literature of the Little Gem Mining Company in the Montreal newspapers some time ago, which invited would be gamblers to sit in at a little poker game promising that the pot they would win would be relative to the amount of the ante. Humour, candour and style were possessed by the drafters of this invitation, but it would be interesting to know how the pot turned out and who won it.

A request for further information made through the mail has brought a circular letter, which among other things states that Pan Extension is "actually shipping gold ore and proving to be the richest mine in Canada."

We are also in receipt of the "Mining Bulletin", dated Winnipeg, November 1920, composed of clippings from Winnipeg newspapers regarding Northern Manitoba mines, and using in that detached manner cultivated by mining promoters the opinions of such eminent mining engineers and geologists as Dr. Wallace, Dr W. G. Miller, Mr. J. B. Tyrrell and others. We are not able, however, to trace any connection between what these gentlemen are quoted as stating and the value of shares in Pan Extension.

A report on the property, dated 1st. September 1920, by Mr. John Beckman, is given in full, the gist of which seems to be that some very rich ore has been found at a depth exceeding 100 feet. Prof. Wallace is quoted as stating that "veins in this district are true fissures and extend deeper than man can mine." From this combination the assumption is made that this rich ore will "prove continuous and regular", and the examples of Cobalt, Cripple Creek, and Kalgoorlie are quoted as high-grade ore-bodies likely to be paralleled by the Pan Extension.

Without very much more detailed information than is contained in the advertisements and in the literature sent to enquirers it is not possible to say what chances a speculator would have of getting his own back again. Admiration for the restrained character of the statements made cannot be withheld, but some improvement could be suggested.

In a report on the Rice Lake District (see page 76, our issue of 28th January) Professor DeLury has this to say about the Rice Lake District: "It will be surprising if in future years the Rice Lake District is found to have no workable gold deposits. The duration of these years will be lessened if a spirit of co-operation is fostered, and active steps are taken to check exaggerated stories and illegitimate promotions, both of which have done the district an infinite amount of harm in the past."

Our readers will find no difficulty in assessing the accuracy of the Pan Extension advertisements or the legitimacy of the promotion, but who is responsible for safeguarding the credit of the Rice Lake District does not yet appear.

BRITISH COLUMBIA FORBIDS OPEN LIGHTS IN COAL MINES.

The action of the Minister of Mines of British Columbia in banning the naked light from the coal-mines of the province deserves unreserved commendation. The cause of every explosion in a coal mine, reduced to its simplest terms, has been the presence of naked flame. Whether the coroner's inquest has attributed the explosion to a blown-out shot, a sparking switch or commutator, an open light, or a damaged safety lamp; to sparks from contact of the pick with hard substances, or the sparks from colliding rocks; to gob fires, matches, or the various well-known reasons that have formed the melancholy burden of many an inquest, the presence of flame in some form has caused the mischief.

With the coming of the electric miner's lamp, the lack of illuminating power that was the greatest drawback of the oil-flame, safety-lamp, is overcome, as the approved types of electric miners' lamps combine maximum illumination with complete safety. The naked light is a fearful anachronism. Its use in any coal mine, whether reputed free from gas and dust, or not, is fraught with constant danger. It courts death.

There was a time when scientists debated learnedly as to whether coal-dust was a true explosive or not. Surely, after the explosion of the Chicago grain elevator, reported at the time of writing, following upon the explosion of the Port Colborne elevator, and that of numerous flour mills at different times, there should be little hesitation in considering the interior of a dusty mine (irrespective of the presence of inflammable gas) as an unfit place in which to use an unprotected flame. A little gas—just a little—increases the danger many times, and what coal-mine known to the miner can be guaranteed to be gas-free?

In the matter of requiring precautions against accidents in coal mines the government of British Columbia is commendably progressive, and we hope someday to hear that the use of naked lights in coal-mines has been unconditionably prohibited throughout Canada.

ANOTHER COAL SHORTAGE LOOMING?

It begins to look as if the United States and Canada were repeating the conditions of the early months of 1919 that brought about a shortage of coal at delivery points in the Winter of 1919-1920. The first quarter of 1919 saw buyers disinclined to pay current prices for coal, mines were closed down, production was curtailed, stocks were eaten up, and on top of all this came the switchmen's strike and complete over-taxing and incapacity of the railways.

At this time bituminous production is at a lower rate than at any time during five years past in the United States. Conditions in Canada are precisely the same. There is an unadjusted wage question connected with the railways of the United States that may cause trouble at any time. The only difference between conditions at this time and in the early part of 1919 is the partly accomplished fall in commodity prices and quotations for bituminous coal that are too low to last. High-cost mines, both here and in the United States, have been forced out of production, and many of them will remain permanently closed, as they were but the ephemeral children of war conditions. Mr. Cushing, head of the American Wholesale Coal Association, estimates the outturn cost of bituminous coal at point of discharging the railroad car has increased from an average of $2.56 to a minimum of $5.51, allowing nothing for selling costs and profits. This increase is represented by higher wages to mine workmen, higher costs of material and overhead, and higher freights. The mine owners are powerless to deal with all these factors of increase, and there has not yet appeared any power than can remove them. If buyers therefore hug the delusion that bituminous coal costs are going to return to pre-war figures, or figures approaching them, they must soon receive disillusion, and abstention from buying at this time—except where it is forced by cessation of operations as in the steel trade—is merely sowing the seed for foolishly high prices later, which will come as a result of a purely marginal shortage and transportation congestion. The buyer who takes advantage of today's quotations for bituminous coal, and gets his coal stored safely away during the favorable transportation weather of this time, will experience no regrets next Autumn.

Production cost of bituminous coal in the United States is estimated at $3.00 per ton. There are of course mines that can produce coal at less than this figure, but an average price of $3.00 per ton at the pitmouth may be taken as about rock-bottom at this time, and lower than prices at a later date. The mine that produced coal before the war at $1.00 per ton probably had an incorrect cost-sheet, and it is much to be doubted whether even the most favourably situated coal mines in the United States—and some of them are the most cheaply operated mines in the World—can today produce coal at less than $2.50 per ton, if its cost of production is calculated over the life of the mine. Any other method of calculation is incorrect.

It seems probable that the new level of commodity

prices which wil prevail for some years to come will depend more upon the selling price of coal than upon any other industrial factor. There is no likelihood of cheapening of coal production arising from the opening of new and plentiful coal reserves in any part of the known world, with the possible exception of the Alberta fields, so that this source of decline in coal production costs can be dismissed.

There is some hope that the cost of light, heat and power produced from coal may be lessened by more efficient modes of use, but this factor will probably not do more than offset the increase of cost of production arising from progressive lessening of the reserves of coal.

Those who undertake the task of reducing the labour cost entering into the cost of production of coal in the United States will find it difficult to overcome the contention of the coal workers that their earning powers are reduced by alternating periods of idleness and forced production, and, until this legitimate complaint of the coal-worker is redressed, little is to be looked for in this direction.

The railways also are victimised by the same unreasonable alternations in demand, and, judging by the few orders given in recent years for equipment or track material, the railways must be less prepared to meet any exacting pressure upon their carrying capacity than at any time since the war broke out.

The present reduced rate of bituminous coal production is therefore regrettable, inasmuch as it foreshadows the recurrence of the same costly scramble for coal supply that has upset industrial and domestic peace so often in the recent years. It is understood that some of the best minds in the United States have undertaken to study the problem of coal supply and distribution in that country, and the task is worthy of such men. In considering this matter it should be remembered that at no previous date in history has any nation ever attempted such a problem in transportation as is presented by the annual distribution of approaching 800,000,000 tons of coal, to suit a fluctuating and seasonal demand, over a territory so vast as that comprehended in the United States, and the territory of neighbours, north and south, that it supplies with coal.

SUBMARINE COAL MINING AT NANAIMO

In this issue will be found a short description of undersea coal-mining at Nanaimo, Vancouver Island that is of interest to coal miners on the Atlantic coast as it tells of the successful employment of the longwall method of extraction at what is, in Canadian practice, slight undersea cover. The abandonment of the undersea faces at their maximum seaward extension was not forced by any difficulties of extraction, but by a deterioration in the quality of the coal seam, which turned thin and dirty.

There is one other longwall operation under the sea, namely the workings of the Maritime Coal & Railway Company in the undersea extension of the Joggins Field Cumberland Co., Nova Scotia. In this instance the seam is quite thin, and dipping steeply seaward, but entire extraction of the seam has been found possible in the first working.

The longwall method is that more generally used in the undersea coal mines of the Cumberland and northeast coast mines of Britain. The suitability of longwall is conditioned to some extent by the nature of the sea-floor, and where clay or clay ooze is present, mining can be pursued under very thin cover without danger of the sea breaking in, but, leaving this consideration apart, the chief advantage of the longwall method of complete extraction is that it allows equal and unruptured subsidence of the sea-floor lying over the extracted area, whereas the "pillar and room" method tends to break the strata, and is especially inapplicable where the strata, is brittle or "short" in its character. If the pillar and room method is employed for the extraction of superimposed coal seams, the distortion and danger of breaking the superincumbent strata is of course much intensified.

PERSONALS

Mr. G. C. Bateman, manager of La Rose Consolidated Mines has been appointed consulting engineer for Bailey Silver Mines. This company operates the Bailey silver mine and a customs concentrating plant at Cobalt. Mr. Bateman continues as manager of La Rose.

Mr. F. J. Bourne, general manager of Bailey Silver Mines, Cobalt, has resigned. Mr. Bourne has played an important part in the development of methods of treating the ores of the Cobalt silver district. He was manager of the Northern Customs Concentrators Ltd. whose mill was recently taken over by Bailey Silver Mines Ltd. His several years of service have brought him recognition as a leading authority on the concentration of silver ores.

Hon. G. Howard Ferguson, Minister of Mines in the former Ontario Government is showing in the Legislature that he has not lost his interests in mining development of Northern Ontario. Mr. Charles McCrae of Sudbury and Mr. Mac Lang of Cochrane are also urging the Government to take a more active part in developing the North and are opposing the proposal to increase the tax on profits.

Mr. W. A. Carlyle has resigned as managing director of the British American Nickel Corporation. Mr. Carlyle came to Canada from London to manage the affairs of this company and had charge of the construction of the smelter at Nickelton and the refinery at Deschenes. He is a Canadian and was well known in British Columbia where he was at one time Provincial mineralogist. He had been practising in London as consulting metallurgist for some years prior to the formation of the British America Company during the war which had as its object the utilization of the Hybinnette refining process for the production in Canada of metallic nickel and copper and the recovery of the precious metals which occur in the ore. The company has suspended operations for the present.

Howry Creek Gold-Arsenic Deposits

(Can. Geol. Sur. Summary Report, 1917, Part "E.")

Gold was found near Howry creek in 1911, the discoverers being James and Charles Bousquet. In the next two years about one hundred claims were staked and some additional discoveries made. Since then the more promising claims have been examined and partly developed by prospective buyers; but mining operations have not followed, although it is expected that a small mill will be built this winter (1917) to treat ore from Bousquet property for the extraction of arsenic as well as gold.

The deposits occur on the north side of Howry creek, a tributary of Whitefish river, all being included in an area 6 miles long from east to west by 1 mile wide. They are conveniently reached from Sudbury by way of the Algoma Eastern railway, from mileage 64 on which a canoe trip of about two hours is necessary to cross Charlton lake and ascend Howry creek (See Figure 1).

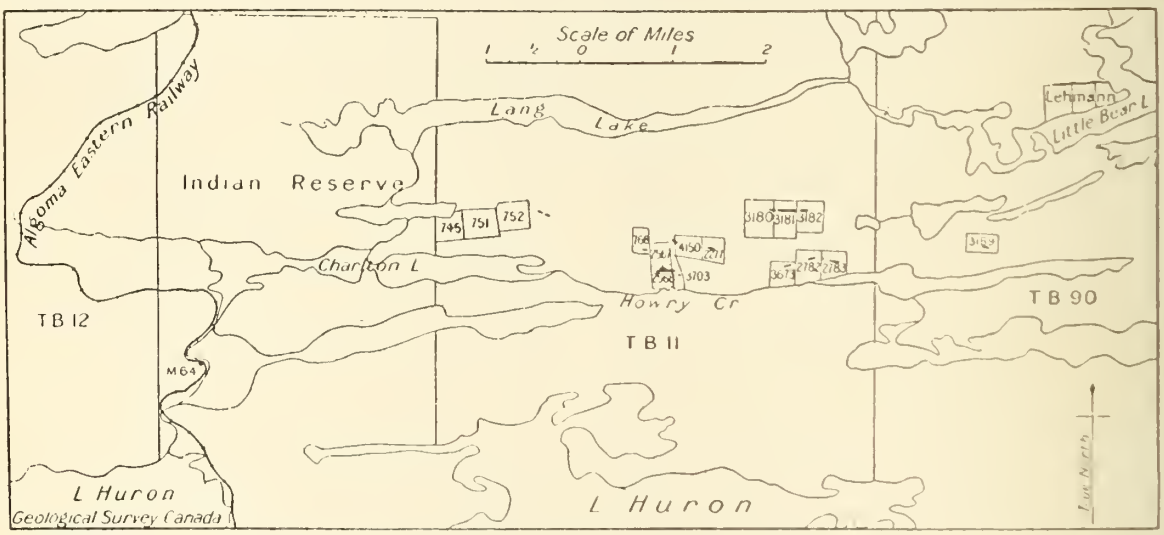


Figure 1. Sketch map of Howry Creek gold-bearing area showing the location of the more important mining claims and more promising ore-bodies (in heavy black lines).

The mineralized area is underlain by quartzite, greywacke, and conglomerate belonging to the upper part of the Gowganda formation and lower part of the Lorraine quartzite (Cobalt series). These formations lie on edge, strike east and west, and are interseeted by a few dykes and larger bodies of diabase (Keweenawan). The ore deposits are chiefly well-defined quartz veins with a general east-west strike and nearly vertical dips. They are composed of white quartz and ankerite carrying arsenopyrite and free gold as their chief eonstituents of possible commercial value. The wall rock, espceially if it is greywacke or conglomerate, is bleached, heavily impregnated with ankerite, and slightly mineralized with the same ore minerals as the vein-stuff for 2 or 3 feet on either side of the veins. One of the deposits (mining locations 3180-8182) is simply a broad sheared zone in conglomerate which has been hydrothermally altered and filled with a plexus of quartz veinlets.

All the deposits are probably the result of a single process of mineralization, since they resemble one another elosely in mineral composition. One vein at least occurs in the diabase, so mineralization must have taken place after the intrusion of that rock. Further than this, however, the age and source of the ore have not been ascertained.

The relative positions of the various deposits are shown in Figure 1. Specific descriptions of the best looking deposits follow.

Steep.—Mining location S3189. A system of sharply defined veins, represented in plan in Figure 2, has been found on this claim. The veins are composed mainly of quartz and ankerite, with sparing amounts of pyrite, arsenopyrite, hematite (specularite), and, it is said, some free gold. The greywacke wall rock between the veins is bleached, heavily impregnated with small crystals of ankerite, and probably slightly mineralized with the same metallic ores as are found in the veins. Very little trenching has been necessary to expose the veins, but in addition to this work a shaft 8 feet by 10 feet has been sunk on the largest vein to a depth of 30 feet. A representative sample from the dump made in sinking this shaft was assayed by H. Leverin of the Mines Branch and found to contain only 0·02 ounce of gold per ton.

Bousquet.—Mining locations S 2782, 2783, 3673. Near the middle of S 2783 an irregular vein shown in plan (Figure 3) has been trenched for 300 feet, and shallow test pits sunk in several places on it. The mineral association composing this vein is like that of the Steep veins, but it differs from the Steep veins in most other respects. Instead of a series of parallel, sharply defined veins there is a single, crooked, branching vein with rather indefinite walls and composed of vein stuff and schistified country rock. The wall rock is feldspathic quartzite instead of greywacke. The gangue of quartz, ankerite, and schistified rock carries free gold, pyrite, and arsenopyrite. The arsenopyrite occurs as the usual greyish-white variety and also as a darker iron-grey variety. It is the most abundant metallic constituent, being continuously exposed in massive form, 2½ to 18 inches wide, for a distance of 150 feet.

This vein was sampled systematically in 1916 by J. S. Wilson and Mr. A. L. Kemp. Some very high values in gold were obtained, but the average from all

the sampes taken indieates a gold eontent eonsiderably under $10 a ton. At present, milling experiments are being condneted with a view to recovering the arsenic as well as the gold.

Six hundred feet west of this vein and approximately in line with it is another of the same character 3 inches to 48 inches wide, which has been stripped for 190 feet. There is much less arsenopyrite present, but good gold values are reported.

Near the north line of S 3673 two smaller exposnres of the same character have also been found.

Black Fox.—Mining locations S 2568, 2703. These claims are underlain by massive white quartzite (Lorraine), through which extends from east to west a series of parallel quartz veins. The veins are from a few inches to 50 inches wide and are exposed at intervals for 400 feet at least, and according to report, for a much greater distance. Individual veins, however, appear to be short. Even the wide veins are only 100 to 150 feet long, terminating in a multiplicity of small stringers. They consist of pure white quartz, with a little ankerite; but, except for a few scattered patches of disseminated pyrite, no metalliferous minerals were seen and a sample collected from the walls and dump of a 10-foot test pit, when assayed by Mr Leverm yielded no gold.

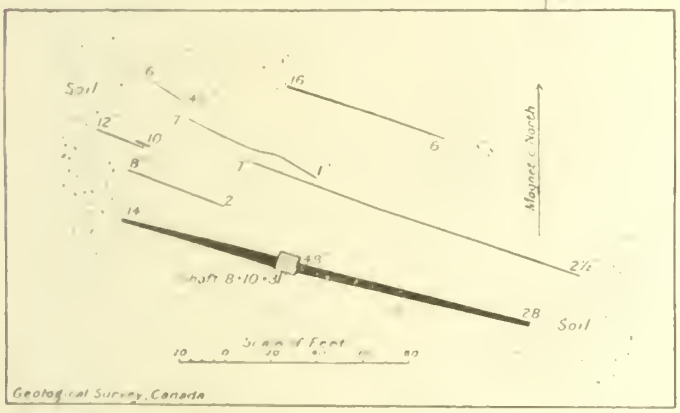


Figure 2. Plan of veins on the St-cp property (mining location S 3189)

Other Deposits.—A vein of the same general character as the Bousquet vein occurs on mining location S 2277. It occurs partly in quartzitic greywacke, partly in diabase. It varies in width from 3 inches to 6 feet and has been stripped for 280 feet. The wall rock is bleached and impregnated with ankerite, arsenopyrite and pyrite, but the vein itself is not so well mineralized as the Bousquet vein. It is reported to carry $6 in gold per ton.

Another vein 10 to 36 inches wide was seen on mining location S 766. It has been traced through the quartzite and along a quartzite-diabase contact for 270 feet. Gold is reported to have been found in it, and arsenopyrite is present in considerable quantity.

An ore-body somewhat different in character from any of the preceding was seen on locations S 3180 81 82. It is a schistified zone in Cobalt conglomerate which has been hydrothermally altered by vein-solutions and filled with many veinlets of the same general composition as the larger veins already described. Some of the veinlets cut across granite pebbles in the sheared conglomerate, indicating that mineralization took place after the rock had been schistified. The mineralized shear-zone is at least 40 feet wide and extends, according to information obtained, for half a mile east and west.

No quantitative determination was made of the gold content in the schist, but samples of the quartz veinlets were crushed and panned, yielding a small amount of gold. From the standpoint of size and convenient mining this deposit is much superior to any of the others, but the average gold content is probably too low to be profitably extracted.

The genesis of the Howry Creek veins is unknown, but their general similarity in composition to the ores of the Long Lake gold mine, which lies 25 miles towards the northeast, has been remarked by many persons acquainted with these properties. It is not

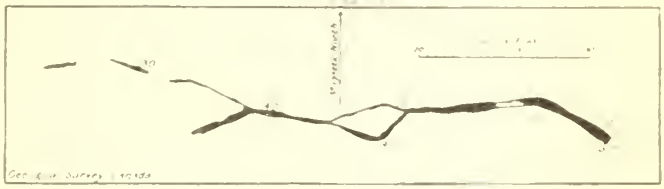


Figure 3. Plan of veins on the Bousquet property (mining location S 2783)

improbable that other gold-arsenic deposits may occur in this 25-mile interval which approximately parallels the contact between the Huronian sediments and the younger Killarney granite to the south.

SUDBURY NOTES.

By D. E. CUSHING.

Goudreau Gold Area.

The Goudreau gold area promises to be active this spring. J. P. Cline, of the Soo is now in charge of work on the Goudreau gold and some claims of his own. On the latter he has sunk a shaft 30 feet and it is said, encountered good values.

J. J. Brothers of the Soo just staked nine claims in Township 47 and the San Antonio Mining Co. 12 claims in the same area.

Proposed Extension of Mining Court's Scope.

Chas. McCrea, Sudbury's M.P.P. is again pressing his mining court bill in the legislature. Last year his measure was thrown out, but the howl which the mining areas set up won over many supporters and caused others to give serious consideration to the demands of the north. So that there is now a chance of the measure becoming law.

Mr. McCrea's bill in a word would allow the Mining Commissioner to deal with patented as well as unpatented claims. In other words it would extend the simplicity, directness and speed of the present popular mining court to the man whose property has passed from the Crown to him. The benefits are generally understood by the whole industry.

Sir Phillip Gibbs prophesies a new world war, "rather soon." In newspapers of the same date it is stated the United States Army has discovered a poison gas so deadly that three drops coming in contact with a person's clothes or skin will kill him and it is the pleasing intention to spray this noxious substance from bombs in airplanes. This is the kind of news that pales the ineffectual fires of Hell, and makes one wonder whether these fabled flames would not be a pleasant rebuke to a daft world as a place of permanent residence.

The Submarine Coal-Field of Nanaimo, Vancouver Island, B. C.

(By our Victoria Correspondent.)

Coal on the Canadian Pacific Coast was first discovered in 1835. The deposit originally directing attention to the coal possibilities of the country, was that situated on the north-east coast of Vancouver Island, doubtless the same as now is under development at Suquash. Specimens were brought in during the year named by the Indians to Dr. W. F. Tolmie, then stationed at Hudson's Bay Company's post, Fort McLoughlin, on Milbank Sound, and used in the following year by the first steamer on the coast, the "Beaver." The coal at Nanaimo was first discovered by Mr. Joseph W. Mackay (then in the H. B. Co's. service) in May, 1850, who was directed to it by the Indians in the neighbourhood.

The first producing mine of the Nanaimo Coalfield was worked by the Hudson Bay Company under the name of the Nanaimo Coal Company until 1861 when it was sold to the New Vancouver Coal Mining and Land Company Limited, an English joint-stock company with head-quarters in London. The first submarine workings were driven from No. 1 shaft, on which sinking operations were started in 1882. The workings from No. 1 shaft are now connected with Protection Shaft, which was sunk in 1891 and is situated on Protection Island about one mile from No. 1 shaft across the Nanaimo Harbour in a northerly direction; and with Newcastle shaft which was sunk in 1900, and is situated on Newcastle Island, about two and one half miles in a north-westerly direction across Nanaimo Harbour. The submarine area penetrated by the workings of these three shafts is upwards of five square miles on the upper or what is known as the Douglas Seam, and, in a more limited area, approximately two square miles, in the second, or what is known as the Newcastle seam.

The upper or Douglas seam is approximately 650 feet in depth in No. 1 shaft, 670 feet in Protection shaft and 324 feet in the Newcastle shaft.

This seam varies from nothing to thirty feet in thickness and is a high volatile bituminous coal. It is massive and broken by irregular joints, producing an irregular hackley fracture. It is black with a subbrilliant to brilliant lustre. It is fairly hard and weathers well. The dip is from 8 to 15 degrees.

The floor and roof of the Douglas seam vary in character from fine conglomerate to sandy shales. The roof consists chiefly of shaley sandstone with sandstone layers and lenses of fine-grained conglomerate. The beds overlying the Douglas seam are mostly sandstone fine grained, and sandy shales with thin beds of conglomerate. The rocks are well exposed along the shore line, but are almost all covered with a deposit of silt in the harbour.

The method used in working the Douglas Seam is pillar and stall mostly, but, where the seam is thin, limited areas have been worked on the longwall method.

The thickness of cover varies from about 350 feet on the north-westerly side of the Harbour to (1600) sixteen hundred feet on the north easterly side. Pillars have been extracted extensively in this seam and have been successfully worked under the thinner covering, numerous cogs are put in, making the method more like a longwall-retreating system, the roof being held up until floor heaves and meets it, very little caving occurring. Under the thicker covering, no cogs are used, except to steady the roof when stumps are being taken out.

The Newcastle seam is from 50 to 100 feet below the Douglas, the intervening measures being shale, and coarse-grained sandstone which sometimes merges into conglomerates.

The Newcastle seam averages about 3 feet 6 inches in thickness, is hard, of very good quality, and makes splendid coal for domestic purposes. It had only been worked intermittently until 1900, since which time it has been worked steadily.

This seam is worked exclusively on the longwall system. The floor is brushed for roadways, and they are carried approximately 36 feet from center to center. The floor, not being very hard, does not make good rock for building pack-wall, so roadside cog-packs are built, these being filled with rock. The mining dirt, together with the rock from the roadways, makes a fairly tight pack between the roadways. The general subsidence is about 18 inches, so by carrying sufficient brushing depth to make the main roadways about 7 feet 6 inches high in the first working, the necessity for re-brushing to make height after a settlement of the strata has taken place is practically avoided.

The undercutting is done in this seam mostly by "Pick-quick" cutter-bar machines, although a few mounted punchers are in use for difficult work.

The drilling is done by rotary compressed-air machines.

The working of this team by machines is very successful and about the following procedure is taken:

When the face is clear, the drilling machine goes along first, drilling holes at regular distances. After the driller comes the machine doing the undercutting. After the machine comes the faceman doing the blasting, and behind him the loaders. Long faces are carried mostly in a semi-circle and the cutting is continuous to the end of the face. After the run over the face is completed the machine is transferred back to the other end of the face by truck. More than one machine is sometimes worked on the different faces. Compressed air is used on the mining machines.

The workings of the Newcastle are in a good many instances right under the worked-out pillar-area of the Douglas Seam, and both seams have been worked out to a depth of undersea cover as thin as 400 feet.

There has been no serious inflow of water from the sea during the history of mining operations in the submarine field at Nanaimo. On several occasions feeders of water have been encountered, but after running awhile these feeders would gradually diminish in volume, and then cease running. On the whole the workings under the submarine area are dry.

The system of haulage in these mines is mixed. On the main No. 1 level from the bottom of No. 1 shaft, or what is known as the North Side, electric motors of the trolley type are used, and run inbye upwards of 2½ miles pulling out trips of cars, from 90 to 130 cars on each trip.

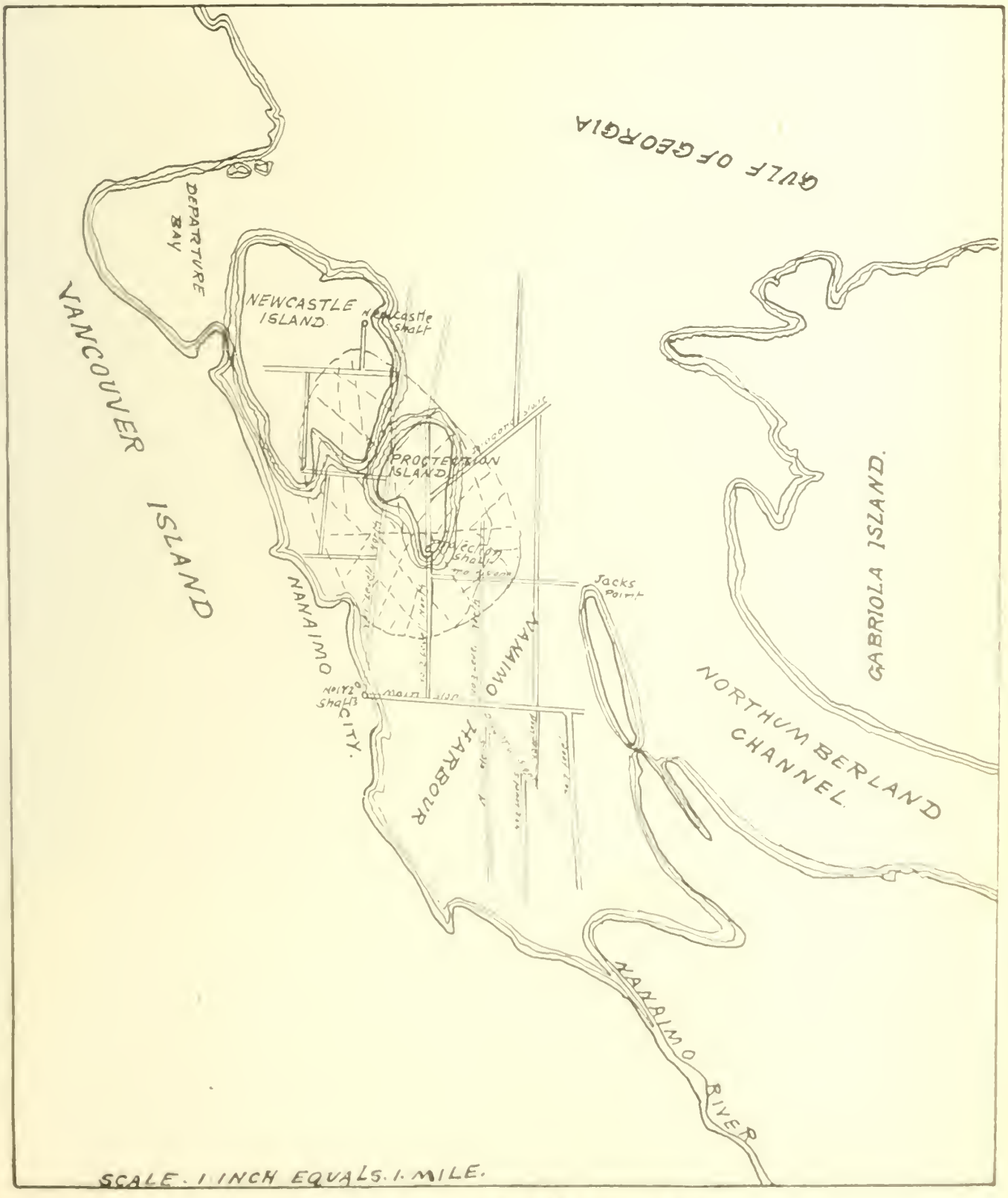
The local haulages feed to sidings on this level by means of gravity-inclines to the raise, and direct slope-haulage to the dip, the haulage in the immediate vicinity of the working face being done with horses and mules.

A few hundred feet from No. 1 shaft on the North Side a pair of slopes are driven to the dip for about 2,200 yards in the Douglas Seam, in an easterly direc-

tion. This is known as the South Side. About 1,000 yards down these slopes, diagonal slopes are driven to the right in a south-easterly direction. These workings penetrate an area known locally as "The Meadows", which is the inner part of the harbour and is situated between two forks of the Nanaimo River emptying into the harbour.

The workings to the left of these slopes are driven right through and connect with Protection Shaft on what is known as No. 3 North Level. The coal from Protection Mine at one time was hauled out along No. 3 Level and hoisted up these slopes to No. 1 shaft, but at the present any coal mined from the Protection area is hoisted on to No. 1 north level and taken out along that level to No. 1 shaft. The system of haulage on the South Side is endless rope, tailrope, and direct slope-haulage. The haulage near the faces is effected by horses and mules.

The ventilation is maintained by two fans, one situated at Protection Shaft and one at No. 2 shaft, sit-



Plan of the Nanaimo Coalfield of Vancouver Island

uated a few hundred feet from No. 1 shaft. There is also an emergency fan at Newcastle shaft. The fan at No. 2 shaft is a 72 x 90 inch double-inlet Sirocco fan, rope-driven, ratio 3½ to 1 and capable of producing 195,000 c. ft. of air a minute with a 4-inch w.g. It is driven by an engine of 350 h.p. A duplicate ventilation installation is kept in readiness for any emergency. This fan ventilates the South Side and part of the North Side workings.

The fan situated at Protection Shaft is a Guibal force-fan 9 x 18 feet, rope-driven at 70 revs. per minute by a 100 h.p. engine. This fan is capable of production 100,000 c. ft. of air per minute at a 2-inch w.g. and ventilates the North Side.

The fan at Newcastle shaft is provided for any emergency that may arise in the ventilating system on the North Side.

The No. 1 shaft and Protection Island shafts are downcasts, and No. 2 and Newcastle Island shafts are upcasts.

The location of these shafts is unique, and give a good sytem of ventilation, from which a high efficiency is obtained.

The Silver Islet Exportation Co. Limited

By J. J. O'CONNOR, Port Arthur.

The romantic interest that attached to Silver Islet during the years from 1868 to 1884, may be revived and largely enhanced by new history, following the present undertakings at this interesting wave-washed gem of Lake Superior. Working on the theory that all the wealth contained in the various veins that intersect the Islet, was not taken out during the former operations, Messrs. Jamieson and Peacock, of Duluth, Minn. secured control of this famous old property, and during the summer of 1920, they unwatered the old workings to some distance below the second level. All of the old workings above this level, were intensively explored, and minutely examined, demonstrating and confirming former reports as to the quantity of silver in the roof of the mine, together with the existence of contiguous veins that offered as promising results as the original developments on the junction of the Silver Islet vein, and what is known as the Macfarlane dyke. These workings extended to a depth of 1,265 feet, with extensive lateral development.

So convinced were Messrs. Jamieson and Peacock, by their experience of the past season, that this property merited further and more extensive exploration and development on a larger scale, that they have organized the Islet Exploration Company, Ltd., incorporated under the laws of Ontario, for the purpose of demonstrating their convictions. The company has a capitalization of $250,000, divided into shares of $10 par value each. This organization is more of the order of a syndicate, than a company, as such terms are commonly understood. There are no investors in this organization that cannot afford to face the results of possible failure. Everyone interested has ample means wherewith to meet the outcome of the enterprise, be what it may. All have been given the fullest information regarding the conditions encountered by Messrs. Jamieson and Peacock. They are going into the undertaking with their eyes open to the fact that they are taking prospectors' chances of finding great wealth, or, finding slightly more in the roof of the mine, than will recoup them for their outlay. It is practically a close corporation, there is no stock for sale, the men behind it are taking all the chances themselves.

The officers of the Islet Exploration Company, Ltd. are as follows: President, J. L. Washburn; vice-president, D. C. Peacock; secretary, A. MaC. Washburn, and treasurer, Frank E. Randall, all of Duluth, Minn.

This company has secured control of the whole of what is known as the "Woods Location" comprising about ten thousand acres in the township of Sibley, of which Silver Islet, lying about two-thirds of a mile off the main shore, forms a part.

Extensive development has been planned by the company, to be begun about April 1st. next. This work will consist of drifting on the dyke to intersect parallel veins that are known to exist, but which, thus far, have never been explored, but are believed to have as great possibilities in silver values as the original Silver Islet vein.

This exploration work will be started from the various levels of the old workings. The old shaft is in splendid shape, and, as was demonstrated last Summer with a pump having a capacity of one thousand gallons per minute, there will be no difficulty in controlling the water, once the mine has been unwatered. Silver Islet in the old days was known as a "dry mine." The old Cornish pump used in former operations, the logs of which, are still in position, had a capacity of only fifty gallons per minute, and met all requirements. It is also planned to do considerable development work in certain parts of the old workings that give promise of developing into rich pockets, as was the experience in former days, under similar conditions.

There is known to be a large quantity of high-grade silver ore in the roof of the mine. One hundred and eighty-five drill holes have been driven into it. This exploration demonstrated that there was over three hundred thousand ounces of silver in the roof. Silver Islet originally consisted of a bare speck of rock about ninety feet square, rising some nine feet above Lake Superior, and exposed to the violence of the elements. The silver in the roof will be the last to be removed from the property, when it is finally abandoned.

In addition to the work on the Islet proper, it is the intention of the company to prospect the main-land in an intensive way, and thoroughly investigate the veins intersecting the dyke zone, of which, many are known to exist, and on some of them considerable prospecting work has already been done with most encouraging results.

It may seem to some that this enterprise is somewhat like looking for "hidden treasure". The best informed, however, have confidence that these enterprising and experienced men will meet with the success their undertaking deserves.

THE LICENSING OF ENGINEERS.

According to the Mining & Scientific Press, the American Association of Engineers, through its local assemblies, is advocating the passage of licensing laws in every State. In Canada also there is an evident desire on the part of many to have such legislation. Engineers who may not be very strongly in favor of such legislation and who do not take an active part in the discussion of the proposals seem to wakening up to the fact that such legislation is coming and that in their own interest they will have to give the matter more consideration than they have done.

The Dolly Varden Mine

By Our Victoria Correspondent.

No mining property has attracted more attention in British Columbia during the past two or three years than has the Dolly Varden, Alice Arm District, northwestern coast of the Province. Coming after the dispute as to the payment of expenditures incurred in the construction of a railway from tidewater up the Kitsault River to the property, the result of which was a parliamentary investigation and the ultimate acquirement of the holdings by the Taylor Engineering Company, the exceptional success of the latter in its mine operations has been widely commented upon in mining circles in the West.

On taking control the Taylor Engineering Company entered on a programme of development so energetically that the railway, which had not been quite completed, was finished and in operation in the course of a few months; the mine was being opened up in such a manner and on such a scale that shipments of ore soon began to arrive at the townsite of Alice Arm en route to the smelter; and it early became apparent that the new owners were working in a considerable body of high grade silver-bearing ore.

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View on Dolly Varden Railway. Trout Creek is on the right.

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Ore in transit to tidewater.

On the 10th of June, 1919, the work of carrying the steel the few miles necessary to bring it in direct touch with the Mine was started and by the 1st of September of the same year the road had reached its inland terminus. This is a striking illustration of the celerity with which the Company took up the task of putting the property on a producing basis. In addition a 2,000 foot 2-bucket aerial tramway, with upper and lower terminal-bunkers, was ready for use.

Between the 1st of September and December 15th of that year (1919) the Mine delivered to the Granby Company's Anyox smelter approximately 7,000 tons of ore averaging 56 ounces of silver to the ton. There also was delivered a small quantity of high-grade sacked ore averaging about 1,000 ounces to the ton.

As to the work of 1920, perhaps the clearest idea of its character and the progress made will be obtained by quoting from the annual preliminary report of Mr. George Clothier, Government Mining Engineer for the District, who says in part:

"The mine department of this company has been steadily operating the Dolly Varden Mines all the year under the management of C. B. North. For the past seven or eight months while the railroad could be operated, shipments have averaged about 150 tons a day, the total tonnage for the year being 28,700 tons, yielding 870,000 ounces of silver. To accomplish this the railroad had to be practically regraded, heavier rails laid for several miles, additions made to the rolling-stock, storage and loading bunkers constructed at the dock and a high line built to them from the main railroad, mine power and equipment increased and mining systematized. In addition to this the railroad grade was extended nearly a mile beyond the mine towards its completion to the Wolf, about 2½ miles above the Dolly Varden. An hydro-electro-

power plant of 500 horse-power capacity was installed just below the Wolf. Ore bunkers were built along the railroad and rails laid to them in preparation for driving No. 6 tunnel this Winter.

"Little or no development-work has been attempted during the Summer, but an extensive programme has been laid out for this Winter. Several raises will be driven through from No. 5 to the No. 4 level; No. 5 level will be thoroughly opened up for the extraction of the ore bodies proven by diamond drilling between that level and No. 4. The new No. 6 level will be driven a distance of 300 feet or more and a raise put through from it to the No. 5 level, a distance of 450 feet. The completion of this work will permit all ore from any part of the mine being brought from the No. 6 level to the railroad bunkers."

BRITISH COLUMBIA LETTER.

The Metal Mines.

The Portland Canal Mining Division, in which the Premier Mine is situated, and the Unuk River District, further to the northeast, have a bright future in respect of mining. George Clothier, government mining engineer at Prince Rupert, B.C., who is making a brief visit to Victoria and Vancouver, makes this statement with the emphasis of confidence and enthusiasm.

A few weeks ago, Mr. Clothier went to Stewart to inspect the "caterpillars" which are hauling ore from

Drilling the ore-body—Dolly Varden Mine

the Premier Mine to tidewater. He found that these tractors are performing admirably. High-grade ore is being brought from the mine to the coast at the rate of about 60 tons a day and this is expected to continue as long as the snow holds. It is his opinion that the proposed aerial-tramway project will be carried through.

Of the Salmon River section, Mr. Clothier speaks with the utmost optimism. It is true that options have been taken on a considerable number of claims only to be permitted to lapse, but this was to be looked for. Mining in this district is not a poor man's job. Because a property, having been located, is optioned and, there being insufficient capital available to proceed with development, apparently is forgotten, we should not write "finis" to its history. This has been the case with a number of good prospects up to the present. There are other instances, however, where serious development has been undertaken, notably that of the Algunician Mining Company, which has expended at least, and no doubt considerably more, than $100,000 in actual exploratory and development work on various properties in the country. More of this kind of activity is what Mr. Clothier hopes to see and he is sure that, if it comes, the returns will justify the outlay, having in mind the general mineral possibilities of the section.

The same promising mineralized zone, Mr. Clothier asserts, extends beyond the Salmon River into the area drained by the Unuk River. This is a much greater territory than that which now is attracting attention because of the success of the Premier Mine. So far it has seen few prospectors. In the scattered instances where it has been penetrated by mining men the result has been the return of samples of ore much the same in character as those found in the Salmon River area, which means that they have been high in silver and gold values. The district is too remote, however, to rouse enthusiasm for the very evident reason that a discovery would have to be rich indeed to yield profits in the face of the transportation problem with which a miner would be faced.

Mr. Clothier, however, is ambitious to see the Unuk River territory opened up and prospected. He thinks that it holds mineral values that when found and developed will bring the northwest of British Columbia prominently before the eyes of the American mining world. To this end he is desirous of seeing a trail con-

The terminus of the Dolly Varden Railway

structed along the Unuk into the district. Such a trail would have to traverse American territory for a considerable distance. The possibility of the American Government contributing to the cost of this project was taken up with Governor Riggs, of Alaska. Whether the suggestion will be favorably considered is a question which, with the recent change in the political colour of the United States' Administration, may remain unanswered for some little time. In the meantime, however, the British Columbia has done considerable work along the lines suggested by Mr. Clothier and, no doubt as financial and other conditions permit, may be expected to continue this policy.

Stewart B. C.

The Columbia Group of Mineral Claims, situated on the middle fork of Glacier Creek, Salmon River District, have been optioned by W. W. Rush and Arthur Bagg to Major General R. G. Edwards Leckie. Development work is to start not later than June 1

Trail, B. C.

Ore receipts at the Trail Smelter of the Canadian Consolidated Mining Smelting Co. for the last week of February were 8,031 tons, made up exclusively of the products of the company mines. This brings the total receipts at this smelter for the first two months of the current year to 66,211 tons, over 11,000 tons greater than for the corresponding period last year.

Golden, B. C.

The Bunyan Silver-Lead Property, Bunyan Mountain, is to be opened in the Spring. It is stated that it is to be developed on a considerable scale, from 100 to 125 men being started to work as soon as weather conditions permit. The Brisco Mine, Columbia Valley, is another property in this locality which is to be developed.

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Trout Falls near Dolly Varden Mine.

Duncan, B. C.

Discussing mining conditions in the Cowichan District, Vancouver Island, Wm. M. Brewer, government mining engineer, recently told residents of Duncan that the chief mining area of the section is that of Mount Sicker and Mount Brenton. When the Tyee Mine, Mount Sicker, was first operated it was well managed but later on this was not so. Referring to the purchase of the Tyee, or Ladysmith Smelter, by Mr. Sieberling, of the Goodyear Tire Co., Akron, Ohio, he said that there had not yet been sufficient ore produced in the tributary district to maintain a customs smelter. Mr. Brewer suggested an amalgamation of the Tyee, Lenora, and Richard III Mines, all at present dormant, as a means of bringing about renewed activity. Granted sufficient capital, say a quarter of a million dollars, and good management the venture should be made a success. There was much ore in the Tyee which formerly could not be handled because of its low grade and the high cost of pumping. The mountain could be pierced, however, from the Lenora workings and the Tyee and Richard III unwatered. The development of the oil flotation process, he thought, brought the ore bodies of these properties, economically impossible under previous conditions, within the range of profitable treatment. In this connection reference was made to the value of this process as applied to the ores of the Britannia Mine. Without it this mine, one of the greatest of the Province, could not be run fifteen minutes.

The Cowichan Lake District, Mr. Brewer said, had the distinction of being the only part of British Columbia, in fact of the Pacific Coast outside of California, to produce manganese ore. It had been found at Hill 60 and at Shaw Creek. While the former workings were closed down now there was good reason to believe that they would be opened up during the summer.

With reference to Mr. Brewer's comments on the Mount Sicker and Mount Brenton properties, as well as to observations he made regarding the Blue Grouse and other mines and prospects at present inoperative but having promise, it should be stated that they are within what is known as the Esquimalt & Nanaimo Ry.

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The longest and highest trestle of the Dolly Varden Railway.

Belt. This area, over 2,000,000 acres in extent, is to be thoroughly explored by the Canadian Pacific Ry. Co., through its subsidiary concern, the Canadian Consolidated Mining & Smelting Co. All mineral in this section, not previously alienated, belongs to the Company. It is reasonable to suppose, therefore, that if the Canadian Consolidated is considering the development of the mineral located, or to be located, within this area it will have in mind the enterprise referred to relative to the unworked minerals of Mount Sicker and Mount Brenton.

It is evident from answers given by Hon. Wm. Sloan, Minister of Mines, to quesions asked in the British Columbia Legislature that some attention is being given to the obtaining of accurate information as to the iron ore resources of the province. He stated that a grant of $10,000 had been made to Mr. C. P. Williams, an English mining engineer of repute, to finance the exploration of all the known iron-ore deposits of importance. To use Mr. Sloan's words these funds were set aside to permit "the determining of the available tonnage of iron ores, coal and fluxes suitable for the manufacture of iron and steel and the accessibility of such deposits to transportation." This work was commenced in November, 1920, and is as yet unfinished. The area over

which Mr. Williams has been working includes Vancouver and adjacent islands and the southern portions of the province including the Kootenays.

There is a possibility that the Drum Lummon Mine, Hartley Bay, B. C., will be opened up on a larger scale than heretofore. Additional finances to the extent of $200,000 are said to be available in New York, most of which is to be expended in providing a mill and adding other new equipment. Glenville A. Collins, who is in charge, has left for the East on this business.

John Burns, who has been touring the West on behalf of the 24th Annual Convention of the American Mining Congress, to be held at Chicago, October 17-22, was a reeent caller on Hon. Wm. Sloan, Minister of Mines. He seeks to have British Columbia represented at this Convention in connection with which there is to be a National Exposition of Mines and Mining Equipment. It is suggested that the Province should arrange to have a very complete exhibit of her commercial and other minerals displayed at the Exposition. Mr. Burns appeared before the Northwest Mining Convention, which took place a few weeks ago at Spokane Wn., and explained the preparations being made for the Chicago Convention and Exposition.

THE COLLIERIES.

An amendment to the Coal Mines Regulation Act of British Columbia has been introduced to the Legislature by Hon. Wm. Sloan, Minister of Mines, which will entirely do away with "naked lights" in eoal mines in this Provinee.

The opening lines of the proposed amendment contain the essenee of the ehange. They read: "No lamp or light other than a locked safety-lamp of a pattern approved by the Minister of Mines shall be allowed or used underground in any mine."

As a matter of fact the regulations have been so strict of late years as to the use of open lights in conneetion with coal mine that they have seldom been found underground. Only where the gas content of the air has been infinitesimal have they been permitted at all. As a result eleetrie lamps have been adopted largely by the large collieries.

Now, however, the Minister of Mines has decided that the open lamp must go altogether. He has concluded that the danger to the underground workers is too great to warrant their use under any eireumstances. Even where conditions seemed absolutely safe there have been instanees of men receiving burns more or less serious because of the unprotected flame.

It is expected that, when the new regulation comes into effeet on July 1st next, the result will be the general adoption of the electric lamp in coal mining in British Columbia.

The coal production for British Columbia for the month of Febrnary, exclusive of the mines of the Crow's Nest Field, follows—

Vancouver Island District.

Mine.	Tons.
Canadian Western Fuel Co., Nanaimo	46,121
Canadian Collieries (D), Ltd.—	
Comox	34,847
South Wellington	6,827
Extension	13,946
Pacific Coast Coal Mines, South Wellington	Nil
Nanoose Wellington Co., Nanoose Bay	4,954
Granby Consolidated MS & P Co., Cassidy	21,681
Old Wellington Colliery (King & Foster)	135
Telkwa Collieries, Telkwa	Nil
Total	128,511

Nicola-Princeton District.

Mine.	Tons.
Middlesboro Collieries, Middlesboro	6,728
Fleming Coal Co., Merritt	3,239
Coalmont Collieries, Coalmont	4,420
Princeton Coal and Land Co., Princeton	794
Total	15,181

It seems probable that the near future will see extended development of the eoal areas of the Hazelton District, Northeastern, B.C. The ever-increasing priee of fuel-oil and its scarcity in the world's markets is causing renewed interest in all promising coalfields. The Telkwa river, Morice river, Zymoetz (or Copper river, as loeally known), Peace river, and Groundhog fields have attraeted attention and large-scale development may be expected before long. Undoubtedly these areas contain large quantities of good-grade eoal and but for the admitted transportation difficulties they might now be in the produetive elass. Some coal was mined by the Telkwa Collieries in 1920 and a short distanee from this property a new seam is being opened up. This seam contains some high-grade blaeksmith-coal and a small output will soon be marketed.

The eoal-mine of the Telkwa Collieries has been working more or less regularly, the shipments of coal for 1920 being estimated at 1,400 tons. Owing to the work of the Grand Trunk Pacific Railway at Telkwa in ehanging the railway-yard, the shipping-bunker for this eoal has been taken away, and at present the company eannot ship coal to Prince Rupert or other points as was being done. Meantime loeal shipments are being made, and as soon as the bunker is replaeed the regular shipments will be commenced again.

The property is now being worked by J. M. Gillespie, formerly manager of the company, who has a lease on all the holdings.

Mr. Gillespie also has a lease on the Aveling coal property, which is situated about 6 miles up the Telkwa river from the town of Telkwa and about 2 miles distant from the property of the Telkwa Collieries. Arrangements have been made to open up a seam of coal on the Aveling property and mining has been eommenced. Part of this seam contains a band of high-grade blacksmith-coal, and it is the intention to mine and ship this. By submitting samples to Vancouver orders have already been received for car-load shipments of this blacksmith-coal, and it is hoped that a considerable market for this class of coal can be secured. Analyses of this coal show it to be low in ash and high in fixed carbon.

Chu Chua Coal Mining Syndicate.—Trustees, W. H. Glass, 1507 North Thirty-ninth Street, Seattle, Wash., and H. W. Schuett, 400 Central Building, Seattle, Wash., and H. W. Schuett, 400 Central Building, Seattle, Wash., Local Secretary, C. E. Max, Kamloops, B.C. This syndicate has secured options on approximately 5,000 acres of coal lands about 2 miles south of Chu Chua, near Kamloops, B.C. A compressor operated by a 50-horse-power steam plant has been installed, a road built to a siding on the

Canadian National Railway slightly over a mile away, and camp buildings erected to accommodate about twenty men. Production has been started, working on a 3-foot seam of excellent coal.

The principal output from the Nicola Mining Division continues to be coal. The Middesboro Collieries and the Fleming Coal Company have both been operating steadily.

Coalmont Collieries.—Under the management of Messrs. Johnson and McLean, this company has developed the coal areas on their property, about 2·82 miles south-west of the town of Coalmont, on the Kettle Valley Railway. A new opening has been made in the mine and different seams blocked out. A new bunk-house and dwelling houses have been built and an aerial tram 15,000 feet long, with a capacity of 60 tons an hour, installed; also a tipple and screens at the railway and a plant to generate electric power for the mine and town.

Crows Nest Pass Coal Field.

Work has been steady throughout the Crows Nest coal-fields.

At Coal Creek and Michel the mines of the Crow's Nest Pass Coal Co. are all in good condition and no new developments have been made.

At Corbin work has been continued fairly steadily, the large portion of the coal coming from Nos. 3 and 4 mines, while some preliminary work has been carried out at Nos. 5 and 6, which are new mines. During the greater part of the year labour has been scarce.

Indications of fresh developments in the Upper Elk coalfield have been in evidence during the past few months, a party having started to reopen the holdings of the Northern Coal Company, but owing to lack of labour the work was continued until this spring.

The total output of coal for the past year is estimated at 827,670 long tons, which shows an increase over that of 1919 of 258,864 tons. The coke production totals at 51,492 tons, which is a slight decrease as compared with that of last year.

Vancouver Island Coal Field.

The Jingle Pot mine was closed down as worked out early in 1920 after producing approximately 800,000 tons of coal from an area of about 70 acres. The mine was opened in 1907 and owned by the British Columbia Coal Mining Company, Limited, since about 1915.

The Canadian Collieries (Dunsmuir), Limited, under the supervision of Thomas Graham, general superintendent has completed in Tsaable River section near Cumberland a total of 7,453 feet of diamond-drilling and 37,400 feet of roadways. Two diamond-drills were in operation. In the Wellington Extension field the company had one drill in operation and bored 1,000 feet on the Haslam flats.

The Granby Consolidated Mining, Smelting, and Power Company has completed the equipment at the Blanmel loading-dock near Ladysmith by installing a rubber belt-conveyor 1,300 feet long which connects the small storage-bins with the hold of a vessel at the wharf. In the coal-washing plant at Cassidy seven Overstrom concentrating-tables have been installed for the purpose of more thoroughly cleaning the slack coal than was possible with jigs alone. A new radial drill, a shaper, and other equipment have been added to the machine-shop. The main slope has been extended about 1,000 feet, thus reaching a total length of 3,500 feet, passing through that part of the field in litigation and into that section the title of which is not in dispute. A Dorr thickener is being installed near the washing plant; the tank of the thickener is 75 feet in diameter by 13 feet high on a concrete foundation. The ventilating equipment at the mine has been enlarged by the installation of a Sirocco fan with a capacity of 150,000 cubic feet of air a minute.

The East Wellington Coal Company is a new organization that has secured a lease on a royalty basis from the Canadian Collieries (Dunsmuir), Limited, of a tract of approximately 2,800 acres of land adjoining the old Jingle Pot mine and extending to the northward. This tract of land is for the most part virgin territory, presumably underlain by the Wellington coal-seam, but also includes the old East Wellington mine, which it is proposed to unwater. Up to the present time the work being done consists of clearing 10 acres for mine buildings, driving a new slope 611 feet, counter-slope 86 feet, crosscuts 155 feet, sump 6 by 12 by 30 feet, and erecting buildings for machinery.

Northern Ontario Letter

THE SILVER MINES.

The Cobalt District.

Suggestions are being made that the present is an opportune time to organize a "Silver League" for the purpose of advancing views which would encourage a general discussion of the question of bimetallism. It is not intended to advance views which would have for their sole object the encouragement of any form of preferential treatment of the silver mining industry, but, instead, to encourage an intelligent discussion of silver and silver mining in its relation to the large amount of paper money now in circulation not presented by actual metal reserves. It is pointed out that a joint discussion between the finance departments of the nations together with bankers and miners should result in determining whether bimetallism in some form is advisable, or not. The possibility of such a conference is now being dealt with by leading financial writers in the British Empire.

A New York metal authority makes this comment: "Proposals of the London "Times" and other leading British newspapers that "silver will have to be resorted to in some cases in order to provide a definite measure of value", is bound to have sensational influences on the silver of foreign origin."

A further significant statement made is this. "Bullion dealers say that if ever the Chinese banks begin to cover their commitments the market is likely to advance very rapidly, for the short account is enormous and the covering of it may turn the market into a state where offerings will be scarce and demand very heavy."

The foregoing statement holds out a hope of reversing the present situation. It is an actual fact that some of the large producers in the Cobalt field made shipments very recently, but a fact which has heretofore not been common knowledge is that a large part of these shipments were for storage and not to purchasers.

Advocates of bimetallism or the remonetization of silver point to the continued decline in production of gold. One marked instance of this is in the United States where the output has declined from $101,000,000 in 1915 to $49,500,000 in 1920. This decline has been quite general in all parts of the world, the one exception being in the Province of Ontario. Here the mines increased their output during 1919 and 1920 but the increase is only a mere drop in the bucket as compared

with the aggregate decline in the gold production of the world as a whole.

In scanning all mining centres of the world, there appears to be no big important gold-mining area that will stem the alarming decline in the production of gold which has heretofore stood as the standard of value—the yardstick of commerce. The one direction in which there appears to be a possibility of propping the standard up to a point where it may carry the vast amount of paper currency is towards bimetallism. The finger of necessity seems to be pointing in this direction.

Robert Dye has been appointed superintendent of the Bailey Customs Mill, the appointment having been made by G. C. Bateman, the newly appointed chief consulting-engineer. It is the company's plan to speed up operations so as to double tonnage coming from the Bailey mine for shipment to the mill. Mr. Dye is well known in Cobalt where he was connected with the Buffalo Mines, and more recently was in charge of operations at the Teek-Hughes mine, Kirkland Lake. For some little time, Mr. Dye was a member of the teaching staff at the mines branch of the Haileybury High School.

A Conciliation Board is sitting this week in Cobalt, in connection with the cut of 15 p.c. in wages which went into effect here February 16th. The Board is made up of Robert Bryee as representative of the mining companies, Arthur Roebuck for the employees and J. Godfrey as representative of the Department of Labour. The total number of employees has dwindled to between 600 and 650, as compared with normal forces of about 2,000 to 2,200. This fact in itself is strong evidence of the serious situation in which the silver mines find themselves, and seems to constitute reasonable justification for a wage reduction.

The Kerr Lake Mines, Ltd., will pay a dividend of 12½ cents per share on April 15th to shareholders of record April 1st. The disbursement will amount to $75,000 and is the first to be paid this year by the company. Total dividends paid by this company amount to $8,935,000. The first disbursement was made Oct. 4th, 1905 and amounted to 2½ cents a share. Profits reached the highest peak in 1910 during which year the dividend disbursements amounted to $1,200,000 an amount equal to $2 a share.

A quite general increase in activity among the prospectors of Northern Ontario is in evidence. Miners' Licenses are being renewed in large numbers, April 1st being the date by which renewals are supposed to be made.

At Haileybury, a new prospectors' association is being organized. The plan in view is to deal with all questions pertaining to the welfare of the prospectors. The idea appears to have originated during the course of the holding of Government prospectors' classes by Prof. W. L. Goodwin, at Haileybury. The class was concluded March 18th, and on the 19th a banquet was tendered Prof. Goodwin in the Vendome hotel. The Haileybury class was quite a success, about 40 or 50 having taken advantage of the free two-weeks course. It is now planned to cover all the mining centres of the district, the following being a list of the centres selected as well as the dates, all classes to be carried on ten days:—Swatstika, March 21st; Kirkland Lake, April 4th; South Porcupine, April 18th; Timmins, April 30th and Elk Lake, May 14th.

Elk Lake and Gowganda.

In the March Bulletin of the Canadian Institute of Mining and Metallurgy the question of railway communication with Gowganda and Westree is discussed. It is pointed out that the proposed line from Swastika to Westree would leave the Elk Lake Branch with very little business, and that the shorter route would be to extend the Elk Lake branch. This suggestion seems to coincide with sound opinion in the district of Temiskaming through which the railway operates.

Diamond drilling operations are being carried on at the White Reserve property in the Maple Mountain district. The work is being done under an option agreement with the National Mining Corporation, a concern with £2,500,000 of paid up capital for investment within the British Empire. J. B. Tyrrell, of Toronto is consulting engineer in Canada for the corporation.

Cobalt Ore Statement.

During the month of February, five Cobalt companies shipped an aggregate of approximately 450.34 tons of ore. A feature of the monthly report issued by Arthur A. Cole, mining engineer for the T.&N.O. Ry., is the fact that of the total shipments, 299 tons went to United States smelters as compared with 151.34 tons to Canadian smelters. Following is a summary, in tons of 2,000 pounds:—

SILVER ORE.

Cobalt Proper.	Tons.
1. Coniagas	86.69
2. Dominion Reduction	179.00
3. LaRose	76.55
4. Mining Corporation	43.99
5. O'Brien	64.11
	450.34

The above shipments were made to the following Companies:—

Canada.		
Deloro Smelt. & Refining Co.	Marmora	64.11
Coniagas Reduction Co.	Thorold	87.23
United States.		
American Smelt. & Refining Co.	Chrome	25.00
— — —	Perth Amboy	87.14
Pennsylvania Smelting Co.	Carnegie	186.86
		450.34

Price of Silver

Feb. 3	Highest	63.250
Feb. 26	Lowest	54.750
	Average	59.233

Ore and Bullion Shipments.

During the week ended March 18th, three Cobalt companies shipped ore, sending out a total of four cars containing approximately 262,334 pounds. The Coniagas was the heaviest shipper with two cars containing 130,963 pounds. The O'Brien sent out one car containing 64,000 pounds, while the LaRose shipped one car containing 67,371 pounds. The total was the highest in recent weeks.

During the corresponding period, the Nipissing was again a heavy shipper of bullion, sending out 137 bars containing 181,151 ounces.

THE GOLD MINES.

The Porcupine District.

All indications point toward an early "break-up" of the ice on the rivers and lakes of Northern Ontario. The breaking of the ice will signalize the return to an adequate power supply and an immediate increase in the tonnage of ore which the mills in the Porcupine district will be able to treat.

Estimates of the earning power of the Hollinger Consolidated are such as may cause added optimism in regard to the operation of this mine. The average grade of the ore is between $9 and $10 to the ton. The net profits are estimated at a minimum of about $4 per ton. The mill has a capacity for treating at a maximum of close to 3,500 tons daily and is expected to establish an average of 3,200 tons daily. This would show a total production of not far under $30,000 daily and with net profits amounting to $4 per ton would result in annual net profits of $4,672,000. This would be equal to close to 19 p. c. on the company's issued capital. An official of the Hollinger made the statement some time ago to the Journal correspondent that the mine might be expected to make a bid for the leading position in the world and for a five year period establish a world record. The time for this achievement has not yet arrived, but the adjustment in the supply of labor is regarded as one important step toward the return to the conditions under which it is expected this record may be established.

It has been intimated in official circles that an early announcement may be expected in connection with plans for the re-opening of the Porcupine V. N. T. Mines. Next to the Hollinger, Dome and McIntyre the operation of the Porcupine V. N. T. promises to occupy a position of leading importance in the Porcupine field. The present mill is rated at a capacity of about 100 tons daily. By the expenditure of $50,000 in remodeling the plant and with certain additions, the capacity may be increased to about 150 tons daily. Ore in sight in the mine contains an average of approximately $10 per ton, and occurs in quite large shoots. The main shaft is down 600 feet, at which point the grade of the ore is the highest so far developed in the mine. Plans for future work include sinking the main shaft to a depth of 900 or 1,000 feet, with main haulage levels at 600, 750 and 900 feet deep.

The question of further diamond drilling operations through the sand plains which lie to the west of the producing section of the Porcupine gold area is being considered by the English interest who hold a large acreage of territory in that district. Last year about 6,000 feet of drilling was done, and the underlying rock formation was found to encourage the belief that ore might be found.

At the 8th level of the Dome Mines, the large underground crusher is now in operation. It will be recalled that a break-down occurred last year which necessitated considerable delay and inconvenience in connection with handling the ore. Certain duplicate parts are to be kept on hand so as to guard against a recurrence of the difficulty. Everything is now in readiness to operate at full capacity, the date for the commencement of speeding up the work depending upon the spring break-up, and the advent of adequate electric power.

Kirkland Lake

Good headway is being made at the Lake Shore mine in driving a crosscut north at the 600 ft. level for the purpose of developing the downward continuation of the main orebodies at that depth. Arrangements for additional power are being made so as to be prepared to handle an increased tonnage of ore.

It is understood the Teck-Hughes has under consideration a plan to increase the capacity of its mill. In this way it is hoped to reduce the per ton operating expenses and thereby add to the margin of net profits.

Just as soon as the snow goes, the Ontario-Kirkland will commence installing its new mill. The management intends to have the mill in operation by early Autumn.

Supplies are being hauled to the Belgood property at Mud Lake so as to be prepared to carry on operations throughout the Summer. D. H. Angus has taken charge of the work at the Belgood.

A deal is being negotiated for the Kirkland Townsite property. Robert Lyman is among those interested in an option on the property, the price being $250,000.

Plans are under way to resume work on the Bourke's Gold Mines, which is controlled by Charles Millar, of Toronto.

Skead Township.

Rich samples of gold ore have just been brought out from the Crawford-Skead property. A shaft is being sunk, and at a depth of 18 feet the vein is said to be about six feet in width. Some coarse gold is showing. Work is also under way on the Skead Gold Mines and on the property of the Northern Consolidated Mining and Milling Company.

KIRKLAND LAKE PROPRIETARY.

(A London Comment.)

The "Financial Times" of London in its "Mining Gossip" column has the following comment on Kirkland Lake companies:

"Mr. Latilla has returned from his visit to Canada, and looks all the better for the change. His object in crossing the Atlantic was not moose shooting, but business. He tells me that he had an exceedingly busy time while at the other side. I gathered that he was quite satisfied with the prospects of the mining interests under his control there, but had not yet had time to correlate all his impressions. It is significant, however, that the prices of Kirkland Lake propositions have steadily improved since his return, so it seems reasonable to conclude that some good news will be forthcoming before long.

"Some time just before the war there was a boom [illegible] of Stock Exchange activity in Kirkland Lake [illegible] and with the present [illegible] appears to be [illegible] where the [illegible]

"The present Kirkland Lake Proprietary [illegible] ganization [illegible] about 1919 [illegible] company of that name, the Tough-Oakes Gold Mines, Limited, the Burnside Gold Mines and the [illegible] Syndicate, while the property of the [illegible] was also included. On the Tough-Oakes there was a 120-stamp battery. [illegible] of the [illegible] and Rhodesian Trust, London, Mr. Latilla explained the [illegible] [illegible] [illegible] tested."

"The latest news from the Tough-Oakes [illegible] [illegible] [illegible] parallel veins had been [illegible] about £300,000 [illegible] £75,000 [illegible] something like 19 p. [illegible]

"As far as I can [illegible]

Exchange, those behind the concern should have little difficulty in getting a move on in the volume of business done, with, of course, appreciation in price."

A circular issued by the Company to its shareholders in England informs them that a cable from Canada under date of 7th March states that a rich vein of silver, giving assays up to 10,000 ozs. with an average assay value of 5,000 ozs., has been encountered on the Alladin-Cobalt property. The vein is described in the cable as being as continuation of a vein from the Nipissing mine. In the neighborhood of this "purple path" to quote the "Financial Times," milling-ore containing 107 ozs per ton has been mined to the extent of 100 tons, and about the same quantity has been blocked out. The vein described as a continuation of the Nipissing vein is 3½ inches wide, striking south-east.

The "Capitalist" states that since Mr. H. G. Latilla returned from Canada to London there has been a remarkable revival in the shares of Kirkland Lake Proprietary (1919) Ld. whose shares were "still kicking about" at the beginning of March at just under five shillings. Since then many thousands have been bought at up to fifteen shillings, and rumor has it that the price is bound for at least £1. The story goes that Mr. Latilla has sold at a good price the whole of the Union and Rhodesian Trust's holdings of Kirkland Lakes to a Canadian group, which may, it is thought, later on offer to buy out the shares remaining in independent hands so as to transfer control of the properties to Canada and avoid British taxation.

MONTREAL METAL QUOTATIONS.

Following are fair average prices for ingot metals (in less than car-load lots) at Montreal:

	Mar. 23	Mar. 16
Copper Electro	17¼	17¼
Copper, Casting	17	17
Tin	35	35½
Lead	6	6
Zinc	7½	7¼
Aluminum	35	33
Antimony	7½	7¼

TORONTO METAL QUOTATIONS.

	March 24
Coppor, electro	18
Copper, casting	17¾
Tin	39
Lead	6½
Zinc	7¾
Aluminum	31
Antimony	8

(Unchanged from previous week.)

ARGONAUT GOLD, LTD. A CORRECTION.

On page 217 of the last issue, in the Northern Ontario correspondence, the total tonnage treated by this Company in 1920 was correctly stated at 4,637 tons, but the amount received for the gold extracted from this quantity was $32,513.05, and not $26,678.25 as stated, making the average $7.01 per ton instead of $5.75. The correct figures are given by Mr. John E. Hardman, Consulting Engineer for the Company.

TORONTO MINING STOCK QUOTATIONS.

Quotations on Active Stocks on Standard Stock Exchange for week ending 19th March 1921:

	High	Low	Last
SILVER			
Adanac Silver Mines, Ltd.	1½	1½	1½
Bailey	3½	3	3¼
Beaver Consolidated	38½	37½	37½
Coniagas	2.00	2.00	2.00
Crown Reserve	17½	17½	17½
Hargraves	1½	1½	1½
La Rose	21½	20	21½
Mining Corp. of Can.	1.00	.00	1.00
Nipissing	8.75	8.60	8.75
Peterson Lake	8	7	7
Temiskaming	25	24½	24½
Trethewey	17	15¾	15¾
GOLD			
Apex	1⅝	1⅝	1⅝
Dome Extension (*)	57	56	57
Dome Mines	17.75	17.50	17.75
Gold Reef	3¾	3¾	3¾
Hollinger Cons.	6.78	6.65	6.75
Hunton Kirkl'd G.M.	10	9	9
Keora	18½	15	15
Kirkland Lake	50	48	50
Lake Shore M. Ltd.	1.25	1.15	1.25
McIntyre	1.98	1.90	1.94
Newray Mines, Ltd.	6½	6½	6½
Porcupine Crown	20	20	20
Porcupine Imperial	⅜	⅜	⅜
Porcupine V. N. T.	21	18½	21
Schumacher	26	24½	24½
Skead	53	52	52
Teek-Hughes	10	9½	9½
Thompson Krist	6½	6	6¼
West Dome	7	6⅞	7
West Tree Mines Ltd.	7	4	5¾
OILS			
Ajax Oil	30	25	30
Petrol Oil, The	29	25	28
Rockwood Oil, Gas	2½	2½	2½
Vacuum G.	16½	13½	16½

(*) Odd lots.

TORONTO COAL PRICES.

Toronto, March 23.—The coal situation is unchanged except that operators are cutting down production to meet the lessened demand. The market for bituminous lump is from $8 to $8.50, Toronto, Canadian funds with slack at 50 c. to $1.00 depending on quality. Smokeless is from $7.75 to $8.50. The anthracite market is at circular prices with very little demand and the independents experiencing difficulty in moving their coal. Operators on high-grade bituminous coal are running only one or two days a week and are "cutting the garment according to the cloth" with the the result that there is very little "demurrage" or "distress" coal.

Mr. H. Foster Bain is to be renominated as Director of the U.S. Bureau of Mines. Mr. Bain was among the Americans who attended the recent meeting of the Canadian Institute of Mining and Metallurgy in Montreal.

Mr. P. E. Hopkins of the staff of the Ontario Bureau of Mines will work in the Skead gold area this summer

THE SINGLING-OUT OF MINERAL INDUSTRIES FOR TAXATION IN ONTARIO.

By ALEXANDER GRAY, Montreal.

Unwise. Suicidal. — Unjustified.

Special Taxation may promote the welfare of politicians and those who are removed from punitive levies. To the degree outlined at Parliament Buildings, Toronto, it is not going to soften the asperities to which the mining industry in general has been subjected as a continuous performance. It will enable the provincial government momentarily to mulct the mines for the benefit of localities unrelated to mining—also there may be grim satisfaction in slaughtering the more prosperous—but no microscope will be required to locate on the map abandoned properties and plants, if tandem taxes are maintained at a rate that must veto enterprise, and at least discourage initiative. Between Ottawa Income Taxes and Ontario's carving of income that might not represent profits, it is in order almost for the graduate in mining and metallurgy temporarily to forget his profession. Certainly capital will not clamor for country where so little consideration is shown for those who take mining risks.

It will be recalled Cobalt had taxes and royalties pyramided upon it by the Provincial Government and the Temiskaming and Northern Ontario Railway Commission. What was not attempted by way of royalties when the rush was on, was an official oversight—if there was a flaw in the title, occasionally a misdemeanor was compounded on a basis whereby the "punishment fit the crime". It transpired however, the percentages prescribed could not be collected, that the companies concerned declined to work almost solely for the smelters and the Government. Those of the public who bought Right-of-way, City of Cobalt, Townsite, and other shares, unmindful or royalties, had reasons to regret it. Eventually the Government's share all-round shrunk,—concessions had to be made—otherwise the properties involved would have remained relatively inactive.

"The limits of the law," it is contended by unscientific economists, ought to be applied to mining corporations whose income is over a million. Admittedly that is frankly coercive. Letting smaller and less prosperous companies "off with a light fine," though, might necessitate the enactment of a series of Blue Sky Laws. "wildcats" would be pentiful. It has yet to be demonstrated that official confiscation of earnings creates enthusiasm or replenishes treasuries. Ontario mineral industries were just about to experience a revival of activity when announcement was made that the Governments are going after them with double-barreled shot guns. Regardless of the urgency of Canada's economic condition, and the necessity for accelerated production all around the immediate effect of the reactionary policy has been to deter capital and curtail production.

Discussing the double taxation policy of the Ontario Government in New York with one of Canada's most prominent bankers, he said: "Immediate action should

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EDITORIAL

Coal Control in Ontario

The office of Fuel Controller of Ontario has been abolished. It is understood that this action was taken for reasons of economy, as the cost of the department was defrayed by license fees. Presumably, therefore, the Government of Ontario believes that there is no longer any necessity for direct government intervention in coal distribution.

Is this really so?

Ontario's fuel-supply problem existed before the war, and it exists now and will continue to exist so long as Ontario is a province of Canada. The war, which caused a congestion of transportation routes all over North America, did not reveal anything new about Ontario's fuel difficulties. It merely emphasised them.

Ontario, so far as coal supply is concerned, is merely an extension of the radius of anthracite and bituminous coal distribution of Pennsylvania, and the geographical situation of Ontario, on the periphery of the distribution circle, indicates that at any and at every time when the transportation routes of North America suffer congestion or breakdown, Ontario will suffer from a coal shortage because she is the last and least preferred applicant at the ultimate source of supply. So far from Ontario's fuel problem being solved, or even relieved, we venture to assert that it is only just beginning, and from now on Ontario will feel, with ever increasing severity, the iron bands of restriction of business expansion and manufacturing activity originating in inability to get all the coal that the Province could use.

When the Fuel Controller of Canada resigned his office he left as a testament one of the most carefully thought-out treatises on Canada's coal-supply problem that was ever prepared, but Mr. Magrath's advice has gone utterly unregarded.

We do not know whether Mr. Harrington has left any record of his conclusions upon the coal-supply question in Ontario, but we do know that the abolition of the office has not abolished the problem.

The House of Commons at Ottawa, before the Easter recess, debated the coal-supply question, and there appears to be some likelihood that a Committee of the House will be appointed to investigate the matter. We would take the opportunity to repeat a suggestion several times made in these columns, namely, that such a committee should be formed and should consult with representatives of the Canadian Institute of Mining & Metallurgy and the Canadian Manufacturers Association.

Some of the questions that need consideration may be noted. The enlargement of the coal inlet facilities of what is known in the trade as the "Niagara Gateway" mentioned in Mr. M. A. McInnis's paper on "Coal Transportation" presented to the Toronto meeting of the Institute in March 1920. The storage of coal—especially anthracite—to avoid the seasonal congestion and the coincidence of the heaviest demand for coal supply with the least ability of the railways and canals to carry coal. The substitution of coal gas, on a very large scale, for natural gas, utilising the existing natural-gas distributing and burning arrangements. The installation of coke-oven plants near large cities, providing gas-fuel and coke in substitution for anthracite. All possible enlargement of the use of hydro-electric power and peat-fuel. The practical application of Mr. Magrath's advice as to a permanent fuel authority in central Canada.

This list—somewhat disjointed and imperfect—indicates some of the practical local problems that need speedy and competent attention in central Canada. No mention is made, in this connection of what may be proved to be the maximum extension of the radius of distribution of the coal that Canada has in the East and in the West. This is another story. Apart altogether from considerations of this nature, Ontario has localised and pressing problems that may be summed up in one question, to wit: "If Ontario must import coal how can it be done so as to avoid periodic shortages, exorbitant costs to the consumer, and so as to obtain maximum comfort and economy in consumption?"

It is to be hoped that the abolition of the office of Fuel Controller in Ontario does not indicate any disinclination in that province to look these questions in the face. And it may be not irrelevant to suggest that all the preliminaries of another scramble for coal are now in the making in the United States. Confirmation of the point of view expressed in this column last week is to hand at the time of writing in a Bulletin of the United States Geological Survey, in which Dr. George Otis Smith and Mr. F. G. Tryon, respectively Director and Statistician of the Survey, point out that if business should suddenly resume at full blast "we know that the railroads will hardly be in a position to haul coal enough to rebuild stocks, meet current consumption, and handle other freight at the same time without signs of distress."

THE PAN EXTENSION GOLD MINE.

The latest advertisement of this flotation, in the Montreal "Star" of the 26th March, states that "Millions of dollars have already been made in Manitoba's mines, but this is only the forerunner of gigantic fortunes which will be accumulated by those who have the courage and foresight to invest in the rich working properties of the Province." We sincerely hope so, but it would be more to the point if the advertisement would vouchsafe in what Manitoba gold mines millions of dollars have been made.

The ore on the Pan Extension is stated to exist as "immensely rich chambers." This a new term in auriferous nomenclature. Possibly these chambers are related to the "bunk" that a correspondent of the "Journal" recently wrote about as being suitable for "lying on," the stuff that dreams are made on?

The 50 cents shares will positively be advanced to 75 cents after March 31st. Presumably this appreciation will take place on April 1st.?

"You can only win by investing" the reader is urged. But is Pan Extension an investment? The information given by the promotion literature would, in our opinion, indicate that it is distinctly a very ordinary gamble.

The subscription blank provided for the use of those desiring to purchase shares in the Pan Extension Gold Mines co., Ltd., contains the following significant clause, namely: "I hereby agree that I have relied on no representations other than those contained in the printed Prospectus and printed matter of the Company, receipt of which I hereby acknowledge."

The intent of this clause is at first reading difficult to comprehend, but we believe, after consideration, that it may be paraphrased as follows: "I hereby accept the representations contained in the printed Prospectus and printed matter of the Company." Such a clause, signed by an applicant for shares, would, we believe, absolve the selling agents from responsibility for statements made in reducing sales and take away any recourse the purchaser of shares might have to successfully protest—afterwards—that the prospectus information was false or misleading.

The clause is not more reassuring than the prospectus representations, and indicates, in our opinion, that Pan Extension shares are not a desirable purchase.

THE COBALT WAGE DISPUTE.

It is reported from Cobalt that the miners will not accept the settlement of wage dispute recommended by the Board of Conciliation. They contend that the cost of living at Cobalt has not decreased to such an extent as to warrant the proposed cut in wages. There can be little doubt however that the circumstances make wage reduction necessary, and that unless the men are willing to accept lower wages there will be little opportunity for them to work at Cobalt. At present only about 700 men are employed by the silver-mining companies. This is about one-third the usual number. Some of the mines will remain closed until conditions are much improved. Those now operating must reduce working costs, and as labour costs form a large proportion of these, the workers must accept some reduction in wages if they are to retain even what little employment the market conditions will permit at this time. It is unfortunate, but inevitable. The workers at Cobalt were given a fair share of the increased revenue that high selling-prices for silver brought to the mining companies, and it should be plainly evident that the mining companies cannot pay out more in wages than the revenues they are now receiving.

Annual Meeting, Mining Society of Nova Scotia, Halifax, April 5th and 6th 1921.

The Annual Meeting of the Mining Society of Nova Scotia will be held at the Halifax Hotel on the 5th and 6th of April prox. The provisional programme includes the following papers, which, it will be noted, are of timely and practical interest. The Mining Society of Nova Scotia has not met in Halifax since its headquarters were moved to Sydney in 1913, and an unusually good meeting is looked forward to. The members are hoping that a number of the Montreal members of the Canadian Institute of Mining & Metallurgy will attend. List of papers to be read, which may be added to, is as under.

"The New Coal Raising and Screening Arrangements at Jubilee Colliery." A.Dawes, Divisional Engineer, Nova Scotia Steel & Coal Company.

"A Mine Fire in Springhill." John C. Nicholson, Dist. Superintendent of Mines, Dominion Coal Company.

"A Description of the Longwall Method as adopted at Jubilee Colliery." John Murphy, Mine Manager, Nova Scotia Steel & Coal Company.

"Conservation of Compressed Air." James P. Cotter.

"Saving the Productive Power of Industrial Cripples by Vocational Training." Prof. F. H. Sexton, Halifax Technical College.

"Deep Undersea Mining, some of its problems and difficulties." A. S. McNeil, Supt. of Mines, Nova Scotia Steel & Coal Company.

"The Relation of the Mechanical Loading Machine to the Mining Industry." Hugh B. Gillis, Supt. of Mines, Dominion Steel Company.

"Central Station Power for Colliery Operations." K. H. Marsh, Electrical Engineer, Dominion Steel Corporation.

"Notes for Industrial Department of the Dominion Coal Company and the Dominion Steel Company." A. W. McDonald, Supt. Industrial Relations Dom. Steel Corp.

"The Opening of the Birch Grove Area." Robert Simpson, Colliery Manager, Dominion Coal Co.

PERSONALS.

Mr. M. M. Makeaver is visiting gold properties in Northern Manitoba. He is interested in the Rex property at Herb Lake.

Mr. R. C. Allen, vice president of the Lake Superior Iron Ore Association has resigned and joined the mining department of Oglebay, Norton & Co., Cleveland. Mr. Allen was for several years State Geologist of Michigan.

Mr. J. B. Tyrrell has returned to Toronto after a trip to the Western Provinces.

Mr. Arthur Hewitt addressed the Toronto branch meeting of the C. I. M. & M. on Saturday Mar. 26.

Mr. Robert Bryce has returned to Toronto from Cobalt. He represented the mine operators on the Board of Conciliation at Cobalt last week.

Coast Erosion of the Carboniferous Rocks of Cape Breton Island

The "Canadian Mining Journal" of 28th May 1920 contained a series of photographs of a prominent spur of the exposed Coal Measures in the vicinity of Glace Bay, Cape Breton Island, showing the progressive demolition from about 1900 of this spur by wave and frost action. By the courtesy of Mr. B. A. L. Huntsman of Sydney, we are enabled to show the remains of the spur at the end of January of this year. The photograph taken a year earlier is also re-produced for comparison, and by reference to our issue of last May, previously referred to, those interested may gauge the rapidity and extent of the erosion that has taken place in twenty-one years.

Winter of 1918-19. End of spur isolated. Notice face with cap on right-hand side of middle portion of original spur. Photo by Mr. Huntsman.
(Reproduced from our issue of 28th May 1920.)

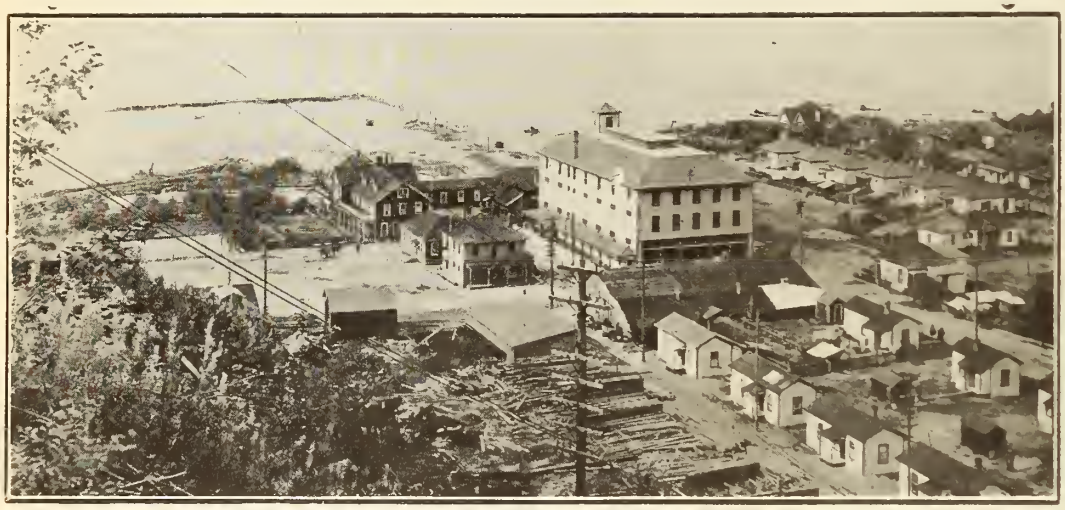
The spur at the end of January 1921.
(Photo by Mr. B. A. L. Huntsman.)

The Britannia Mine, Howe Sound, B.C.

(By our Victoria Correspondent.)

THE FIRE AT BRITANNIA BEACH, B. C.

Vancouver despatches reported a fire at Britannia Beach, Howe Sound, B. C., which we are informed by our British Columbia correspondent destroyed the concentrator of the Britannia Mining and Smelting Company. The electric power-plant, compressor plant, machine shops and the homes of the community were saved by the efforts of a small force of men under the direction of General Manager E. F. Donahue. The outbreak is believed to have been the result of a short circuit, and the flames had advanced too far, before being noticed, to be controlled. No official estimate of the loss has been given but is is placed roughly at over a million dollars. Mr. W. R. Quigley, vice-president of the Company, is quoted as stating the plant will be rebuilt.



Britannia Beach,
Howe Sound,
B. C.

The accompanying views show the concentrator when newly erected, and the manner in which the town-site is laid out on the beach will indicate how seriously a fire would threaten the community.

An historical account of the Britannia enterprise, by our British Columbia correspondent, is included in this issue.

Historical.

The first discovery of copper ore (chalcopyrite) made on the property now known as the Britannia mine, was in 1898. This was made by a party of trappers, and resulted in the staking of four mineral claims, which comprised the original holdings of the Britannia Copper Syndicate organized in 1899 by Howard Walters and associates, who had acquired 7/10ths of the group of four claims from Leo Boscowitz of Victoria, the purchaser of the claims from the original locators.

The Britannia Copper Syndicate was organized with capitalization of $250,000 divided into 400 shares of the par value of $625 each.

This syndicate performed considerable development work, and about 1904 sold a control of the capital stock to George Robinson, of Butte, Montana, and Henry Stearn, of New York, on a basis of $1,500 a share, who also later purchased the 3/10ths interest retained by Boscowitz; organized the Britannia Mining and Smelting Company Limited; purchased the Smelter built by Breen and Bellinger at Crofton, on the east coast of Vancouver Island; erected a concentrating plant, wharf and bunkers at Britannia Beach, Howe Sound; and connected with the mine-workings the concentrating mill by an aerial tramway two and a half miles long, built in two sections.

Operations were carried on under the management of George Robinson until his death, but concentration of the ore by water proved unsuccessful. With the then low price of copper, the ore was of too low grade to be profitably smelted direct, and it appeared as though the enterprise would result in failure. About that time the late G. B. Schley of New York acquired a control of the company, and commenced a policy of systematic development and thorough prospecting of the property. Although the mine was withdrawn from the list of producers from about 1907 to 1910, the results from the development work showed that there was about 400,000 tons of ore actually available of sufficiently high grade to be smelted direct. Owing to Mr. Schley's perseverance and indomitable courage, as well as his ability to finance the extensive programme for development which he outlined, the enterprise was changed from a possible failure to a success, and since the introduction of the flotation method of concentration, by which the enormous tonnage of low-grade copper ore occurring in the mine can be successfully treated, the Britannia mine ranks among the most important copper mines in the British Empire.

Since the late Mr. Schley acquired the control of the company, the original property has been so greatly enlarged by the purchase of adjoining mineral claims that today the holdings are represented by about 500 claims covering an area of about 20,000 acres in a solid block. For convenience, the present productive part of the property, or that portion from which the ore is being mined as distinguished from the claims being prospected, is subdivided into four divisions, known as the *Jane*, *Bluff*, *Fairview* and *Empress* mines, which adjoin each other and are all connected in the workings. The *Jane* is the most westerly, the Bluff is east of and adjoining the *Jane*, the *Fairview* is east of and adjoining the *Bluff*, and the *Empress* is southerly of and adjoining the *Fairview*.

The *Jane* mine is opened underground for a length of upwards of 1,000 feet from west to east along the strike of the mineralized zone; the *Bluff* extends for

800 feet east from the *Jane*. The *Fairview* mine extends for 2,500 feet east of the *Bluff;* and the *Empress* underground workings extend for 1,200 feet from west to east along the strike of the mineralized zone.

Development Work.

The underground workings today begin at the portal of an adit 9 feet high by 13 feet wide by about 4,000 feet long, at an elevation of about 200 feet above the sea, and a short distance from the shore of Howe Sound at Britannia Beach, the headquarters for the concentrating mill, electric power plant bunkers, terminals of the electric aerial and incline tramway and wharves.

This adit is termed the 4,100 foot level on account of being this distance below the outcrop of the ore bodies on Britannia Mountain about 4 miles easterly from the beach, and where the main mine workings are located. An upraise is being driven from the adit level to connect with the underground workings on the 2,700 level, or 1,400 feet above the 4,100. When this connection is made, the adit on the 4,100 level will be the main haulage way for the transportation of the output of ore mined.

The mine workings in the mine proper are best described in descending order from their start at the summit of Britannia Mountain, at an elevation of 4,530

The Concentrator of the Britannia Mining & Smelting Co.

feet above sea-level, where glory-holes are opened covering an area of about 1,100 feet from west to east and 400 feet from north to south.

This glory hole extends from the surface to the 250 feet level, at an elevation of 4,100 feet above sea-level, and the ore mined in it passes down a rock-raise to the 1,800 foot level, which is 2,500 feet above sea level, where the ore is drawn and transferred by electric train to the main rock raise No. 68, down which the ore passes to the 2,200 foot level, at an elevation of 2,150 feet above sea level, and which is at present the main haulage way.

The Mine workings originally were located on and above what is now the 1,000 foot level at an elevation of about 3,300 feet above sea level which was the main haulage way until the winter of 1915, when the log slide occurred that destroyed the mining camp and terminal of the aerial tramway on that level. Since then a main adit has been driven at the 2,200 feet above sea-level, which is at present used as the main haulage way and entrance to the underground workings. This adit is equipped with electric haulage and is 4,712 feet in length, 9 feet high by 13 feet wide, driven in a south 30 degrees easterly direction, crosscutting the formation. At a point 3,900 feet from the portal the No. 1 vein is exposed, on which the upraise, known as the No. 1 shaft, is located. This is a vertical upraise to the 1,000 foot level and is the main hoisting shaft for transporting men, timbers and supplies to the upper workings.

All of the ore is mined from the levels above the 2,200 and transported to the bins on that level by gravity down two rock-raises, the main one known as No. 68 rock-raise made on the No. 3 vein. This extends from the 850 foot level, at an elevation of 3,500 feet above sea level, to the 2,200 foot level and has connections on every level between these two. The other rock-raise is known as the No. 61 or auxiliary, and is made on the No. 1 vein from the 2,200 to the 1,000 foot levels, with connections at every level between.

In all there are upwards of 40 miles of underground workings in the mine proper.

During 1920 another section called the Victoria section of the mine, was developed, in addition to the *Jane*, *Bluff*, *Fairview* and *Empress* sections.

The total development work done on working openings during 1920 is represented by:—

Raises	1,454 feet.
Drifts	2,825 feet.
Cross-cuts	2,208 feet.
Chutes	1,094 feet.
Total	7,581 feet.

In addition there was diamond drilling on the 1,000, 1,200, 1,600 and 1,800 foot levels, totalling 5,696 feet.

Electrical power is employed throughout the vast system of works operated by the Britannia Company. This power is generated by water power developed by a system of reservoirs and dams on Britannia creek on the north side of Britannia mountain and Furry creek on the south, from which the water is carried by ditches and pipe lines to the power plants. These streams drain a very extensive area of mountainous country, and each creek has several tributaries and carries a very large body of water, flowing with a fall of nearly 4,000 feet within the comparatively short distance of about 3 or 4 miles.

The total water power used is 6,000 horse power. Electric motors are used for hauling ore trains underground as well as in the open on a switchback railway about 3 miles in length; hoists in the mine are operated by electricity in the main shaft from the 2,200 foot level up to the 1,000 foot level, of 1,200 feet vertically above the 2,200; also in the shaft from the 1,000 foot level up to the 500; while in the concentrating mill, machine shops and other parts of the works all the machinery is driven by electricity, and the towns and main mineworkings are also lighted by electricity — in fact, it is the power universally employed throughout the entire year.

The Britannia Mining Company was the first company in British Columbia to adopt the Mineral Separation Company's flotation process for concentrating the low grade copper ore that occurs on the property. This was done after thorough and systematic tests had been made, to ensure that the process would give sat

isfactory results. The first unit was erected at Britannia Beach with a capacity to treat 1,000 tons a day, and later this increased to about 2,500 tons a day, which is approximately the present capacity. Of this tonnage there is an appreciable quantity of the ore delivered on to the grizzlies at the top of the mill that is sorted out on the picking tables and shipped to the smelter direct. The remainder is first concentrated by jigs after passing through the crushers and rolls. The products of concentrates made by jigging represents about 40 per cent of the total product shipped to the smelter. The tailings from the jigs are transferred to the tube miles, crushed fine, and sent to the flotation cells, and the concentrates are shipped to the smelter, while the tailings, after being carried through launders, are deposited on the beach by means of a short tunnel driven from under the side of the mill to low tide mark, so that when the tide floods the material is carried out to sea.

The mill building is designed so that gravity is employed to the fullest extent possible in handling the ore, which is delivered from the 20 ton skips on the incline railway into the orebins at the top of the mill at an elevation of about 250 feet above sea-level. The ore then passes over the grizzlies from which the undersize passes direct to the jigs and the oversize to the picking tables, thence to the rolls and jigs, the tails from which are treated by flotation, and the concentrated product, which represents approximately 60 per cent of the tonnage, after being dewatered is shipped to the smelter at Tacoma, Washington.

The output for 1920 was as follows:

Tons of ore treated	697,897
Ounces of Gold produced	6,013
Ounces of Silver produced	90,672
Pounds of Copper produced	16,201,266

MINERAL IMPORTS AND PRODUCTION IN CANADA.

The April letter of the Royal Bank of Canada gives the sum of value of ten principal imports from the United States in the fiscal years 1914, 1920 and nine months of 1921. In the four items of mineral production and fabrication, the following imports are recorded:—

	Fiscal Years (In Millions of Dollars)		
	1914	1920	1921(9 m.)
Iron and Steel	$113	$182	$187
Coal	47	60	84
Petroleum	13	28	38
Non-ferrous metals	29	41	38
	$202	$311	$347
Total Value of Canadian Mineral Output	$129	$176	$217

Some allowance must be made in studying these figures for the decreased purchasing value of money, which has had the apparent effect of increasing intrinsic values, but, even making this allowance, the record is anything but creditable.. It is a fairly exact explanation of the 14 per cent discount on Canadian currency which now appears to be a stabilized rate, and likely to persist for a long period to come. When a major producing industry runs 130 million dollars to the bad, it is evident that Canada is a long way from self-sufficiency.

NOTES FROM THE NOVA SCOTIA COLLIERIES

The Dominion Coal Company's management announce that the outlet for production of the Cape Breton coal mines apart from stocking, is 125,000 tons monthly. The normal production of the collieries, with present working forces, is probably 325,000 tons monthly, so that only from one-third to one-half operation of the collieries is possible under present conditions of outlet. A stocking bank of 165,000 tons is reported to have been accumulated, and it is considered improbable that this will be added to this season. During similar trade conditions in previous Winters it has been usual to divide the available employment among the collieries, keeping them all in part-time operation, but the Company has closed one of its more expensive mines, and it is intimated that other collieries will be closed temporarily, and naturally selection of the mines to be suspended will be decided by considerations of cost of production. The policy of the Company indicates that the unbalanced character of the working organization, which is a legacy of the war and heavy enlistments of coal-cutters, still exists. This unbalanced condition, which consists in an actual shortage of miners and a surplus number of non-producing auxiliary employees, has been found very difficult to remedy, and, indeed, there is no remedy except that of dispensing with the services of auxiliary employees until such time as the ranks of the miners can be brought back to the necessary numbers. It goes without saying, moreover, that it is much easier to diagnose this ill than to apply a remedy. There has never been any appreciable varying of the productive capacity of the individual miners in the Nova Scotia coalfields during the past eight years, but the ratio of miners to auxiliary workers was upset by enlistments during the war period, and particularly in 1916 and 1917, has never been restored. There are reasons to believe this ratio may never be restored.

The St. Lawrence navigation has opened this year at an earlier date than has occurred at any time since shipments of coal from Nova Scotia to the Montreal market became at all important and it should be found possible to send coal up the River at an unprecedently early date. It should be noted, however, that navigation aids are not placed in the River, and that insurance companies impose certain limitations on the use of the St. Lawrence and Gulf routes before specified dates that are based on normal seasonal conditions. Giving due weight to these considerations, however, an unusually early appearance of Nova Scotia coal on the Montreal market may be looked for this year. Some relief to outlet conditions at the coal mines may then be anticipated.

A more uncertain factor is the extent to which the Nova Scotia companies will be able to reduce production costs, and it is becomingly increasingly evident that it would have been better for the miners, last October, to have refrained from demanding increased wages with the inevitable accompaniment of decreased employment, and to have adhered to the current wage scale. The ability of the coal companies in Nova Scotia to meet current competition in selling prices under the prevailing wage scale is a very doubtful thing. In so far as a number of the smaller and more difficult operations in the Province are concerned it is not possible, and it may be expected that the attempt to operate under current wage rates will in a number of instances be given up.

Petroleum Possibilities in British Columbia--The Policy of the Provincial Government

By our Victoria Correspondent.

There is an impression that oil cannot be recorded and title obtained to the lands upon which it is found in British Columbia. This is not so. Under the "Coal and Petroleum Act" of the Province, all unreserved oil-lands, title to which is vested in the Crown, are open to staking.

The catch, if it may be so termed, is in the word "unreserved" as there has been a considerable block of Crown Land in the northeast of British Columbia placed under reserve in respect of its oil values. Generally speaking, this is known at the Peace River Country and for years there has been a well founded belief that with prospecting, and the exploration of the promising locations, oil will be found in commercial quantities in this section of the Province.

That this opinion is sound has been very materially confirmed by the discoveries in the Fort Norman District, Northern Alberta. This region is adjacent to the Peace River Country, B. C., and is similar geologically. There, therefore, are stronger reasons than ever for the conviction, based on expert engineering advice, that led the Provincial Government to place a reserve on this area, its policy being to hold the oil, if it exists, for the benefit of the people. It is in line with this policy that Hon. T. D. Pattullo, Minister of Lands, has obtained for the past two years from the Legislature the funds necessary for carrying on explorations which, it is the intention, shall be followed up by active development at an early date. He and his colleagues have decided that, as far as this area is concerned, the speculator is to be barred and that the government, before it enters into negotiations with private interests, if it should decide that it is expedient so to do, shall have as accurate informations as possible of the value of the lands in question. In other words, it is proposed first placing the proposition outside the bounds of speculation and bringing it within the limits of an investment; as far as this can be done, of course, in dealing with the under surface oil content of any locality.

But the point to be made clear is that by no means all the Crown Lands of British Columbia are under reserve. By far the greater proportion of its sparsely settled, or altogether uninhabited territory, is open to the oil prospector. There are sections in the north and the northeast that are promising and the oil in which is available to the fortune staker. This is true, too, of considerable areas in the southwest of the Province. Under the circumstances it is not likely that the prospector is going to be discouraged. After all the Peace River Block is but a small proportion of the whole Province and, if the Government is successful in its development, there will be the satisfaction of establishing that oil in sufficient quantities to make it of commercial value exists to the west of the Rocky Mountains. And, if it is found in one place, why not in another of the same geological characteristics? There are other such sections in British Columbia outside the Peace River Block.

It is interesting to note that the present oil excitement in the Canadian West is not confined to the Fort Norman District. Reports declare that over 300,000 acres of land has been filed on and recorded for oil lease in the Ponce Group section of the Peace River. The area thus attracting attention is divided between British Columbia and the Province of Alberta. The part on the British Columbia side of the line is within what is known as the Dominion Peace River Block, an area of 3,500,000 acres ceded by the Province to the Dominion as a subsidy payment in connection with railway construction of about half a century ago. Oil lands within this Block, therefore, come under the regulations of the Federal Government and are not affected by the Provincial Reserve.

The Imperial Oil Company, having filed on some 36,000 acreas of the Prouce Coupe region, already is engaged in preparations for the season's prospecting. A complete drilling outfit, capable of going down four thousand feet, is being freighted over the winter trial. The first derrick and building are under construction. So far there has been no wild-catting in leases, the holders of leases evidencing no willingness to part with their holdings.

Report of Messrs. Dresser and Spicker.

To revert to the British Columbia Peace River Block, Hon. Mr. Pattullo, Minister of Lands, submitted to the Provincial Legislature recently the report of John A. Dresser, consulting engineer, and Prof. Edmund M. Spieker, of the John Hopkins University, who carried on geological survey work in that country during the summer of 1920.

Closer investigation was made of the areas described by the late Prof. Gwillim as being structurally favorable owing to the rolls and folds of bullhead sandstone, the geological equivalent of the oil or tar-bearing strata of the Lower Peace River, Athabasca River and of the Black Diamond Area in Southern Alberta.

The report confirms that of the previous year as to the oil-bearing character of the St. John shales and the possibility of oil accumulations of commercial value in the porous sandstone beds or in the upper parts of the Bullhead sandstones immediately beneath them, and suggests the most suitable points at which drilling may be started.

Promising locations were determined near the Gates of the Peace, on the Red River, on Lynx Creek, near the Southwest Halfway Creek; near the trail to Hudson Hope, while the anticlines of Miller Creek, Pine River, Table Mountain, Rocky Mountain, Lake, Moose Lake, Flat Creek, Canyon and Bullmoose Creek and the Boulder Creek dome, show possibilities.

The Boulder Creek formation is most promising, its dome-like shape making it almost perfect as a reservoir structure, while it is underlain within 1,300 feet of the surface by the lower sandstones of the Bullhead Mountain formation and the upper shales and limestones of the Pine River formation, a series of at least 300 feet in thickness, and probably more, which may contain petroleum; the extremely hard Boulder Creek member of the Bullhead formation has been cut away by erosion at the apex of the dome, and the amount of hard rock to be penetrated in order to reach the lower section is less than it would be elsewhere.

While no unquestionable seepages of petroleum were observed, a seepage of gas was found on the west flank of the Boulder Creek dome, northwest of the drilling location selected. The gas bubbles up intermittently through water in a hole at the base of the tree, the roots of the tree undoubtedly affording a channel through

which the gas escapes from the underlying sandstone to the surface. The gas is highly inflammable and contains a considerable percentage of hydrogen sulphide and gives a strong odor of sulphur dioxide when burned.

Referring to the absence of oil seepages, the report states that vast oilfields, today yielding millions of gallons exist without a single surface indication, so that their absence must not be taken as an unfavorable factor, provided the other features are favorable.

Summarized, the favorable factors are:

1. The presence of a number of formations in which oil could occur.

2. The presence of anticlines which dispose the possibly oil-bearing strata favorable to the retention of petroleum.

3. The comparatively reasonable depth within which the beds to be tested may be reached.

The Minister of Lands considers the report an invaluable guide to exploratory drilling operations, while it also furnishes a large amount of detailed geological information which should prove of great service.

ONTARIO'S COAL SUPPLY.

By R. E. Hore.

At a meeting of the Toronto Branch of the Canadian Institute of Mining and Metallurgy, held on Saturday, March 26, the chief topic of discussion was that of Canada's coal supply. The speakers confined their attention chiefly to the problem in Ontario, and more particularly in the city of Toronto.

Eastern and Western Canada have local supplies of coal and their problem is quite different to that of Ontario, which depends almost entirely on United States coal mines for its supply. As to whether Ontario might advantageously be supplied with Canadian coal, there is much doubt. Those who spoke at the meeting assumed that the probability is that our coal will not be used in Toronto and vicinity because of the high cost of transportation from the Eastern and Western coal mines. Starting with this assumption, some suggestions were made regarding protection in times when coal from the United States cannot be obtained in the desired quantity.

Mr. Jas. McEvoy outlined a plan for creating in Toronto a reserve supply of coal. He suggested that an endeavor might be made to build up a reserve of about one million tons which would be stored under water. He suggested using natural hollows which might be dammed and filled with coal which would remain under water until such time as it was required. This coal would be for use in case of emergency only and would properly be regarded as an insurance against stortage. Mr. McEvoy stated that the cost of such storage in the case of anthracite would be about $1.32 per ton and for a year's supply of bituminous coal about $1.00 per ton.

Mr. Arthur Hewitt, general manager of the Consumers Gas Co. called attention to the fact that a very large percentage of the citizens of Toronto are using gas for fuel. It would be a very serious matter if the supply of coal for making gas should fail for even a short period. His company uses about 300,000 tons coal per year in making gas for Toronto users and during the fuel shortage experienced much difficulty in keeping a reasonable supply of coal on hand. It is doubtful whether the people of Toronto fully realize how dependent they are for their daily needs on an adequate supply of coal. He thought that the cost of handling and transporting coal to and from a storage pile would be so high that it would only be advisable to attempt storage for very emergent situations, in which case a few dollars per ton additional cost might be considered of little moment. Under ordinary circumstances, however, any extra handling of the coal should be avoided. The men at the mines must work all the year round, and it would not be economy to push production hard at one season of the year if there is a possibility of spreading the work evenly over the year.

There followed some discussion on the possibility of bringing Canadian coal into Ontario. Some ventured the opinion that the territory between Winnipeg and Montreal will continue to be served most satisfactorily by United States coal. Mr. McEvoy, however, thought that the high-grade coals of the west might be brought further east than Winnipeg, and probably into Northern Ontario if the freight were handled in a way to permit reduction of freight rates. Heavier trainloads might advantageously be used. With reasonable freight rates the high-grade coals of the West would be able to compete with foreign coal for some distance east of Winnipeg. The bringing of low-grade coal to Ontario, however, is not likely ever to be a profitable business.

It was brought out in the discussion that Toronto uses about 2,500,000 tons of coal annually.

CHINESE CONDITIONS UNFAVORABLE TO SILVER FUTURE.

Messrs. Samuel Montague & Company's circular for March 3rd, contains the following note on the Chinese market for silver:—

"Reuter cables part of the address of the Chairman of the Hong-kong and Shanghai Banking Corporation at the annual meeting, which is hardly favourable to the future of silver. He said "China's trade balance is at present the governing factor of the silver situation. The prospect that China will be able to increase or even maintain last year's import of 98,500,000 ounces is at least doubtful. Speaking generally, the stocks of imported goods lying in Hongkong and China port are not excessive and do not exceed the normal pre-war figures. The markets of the interior are bare of supplies, justifying the anticipations that trade will soon resume its normal course. The prospects of the cotton industry in China are encouraging. The political unrest in China and the wide gulf between the North and South foreshadow a postponement of the establishment of a representative authoritative central Government. Financially the position is equally serious. The Government, in spite of large revenues from salt and Customs, is still in dire straits to meet its many obligations and administrative requirements, notably to pay its disproportionately large army. As regards the consortium, no loan can be considered so long as factional strife continues and the central Government's hold on the provinces remains in its present unsatisfactory condition. If this results in China borrowing at home rather than abroad, so much the better."

PEAT FUEL IN EUROPE.

Partly on account of the prevailing scarcity and high cost of coal in Europe, and partly as a result of technical advances in its utilization, peat is being increasingly used for fuel. One railway company in Sweden operating four hundred kilometers of line employs peat exclusively to fire its locomotives. A Norwegian coasting company uses peat fuel on its boats, and maintains a more regular service than when it used bunker coal, which could not always be procured. — "Living Age."

THE PROPOSED ONTARIO GOVERNMENT RAILWAY FROM WESTREE TO SWASTIKA.

(R. E. HORE.)

Hon. Henry Mills, Minister of Mines, and Hon. Beniah Bowman, Minister of Lands and Forests, are evidently favorably impressed with the arguments of those who are asking for the construction of a railroad to assist in the development of the areas which includes the Matachewan and West Shiningtree gold districts and the Gowganda silver districts. Both Ministers in reply to a petition for the railroad, presented on Friday, March 17th, stated that something should be done to improve transportation facilities in the area and indicated willingness to consider the project seriously. Premier Drury had expected to be present to receive the deputation, but was unavoidably detained at a meeting of the Waterways Commission. Hon. G. Howard Ferguson was present and promised that his group in the Legislature would strongly support the project if the Government should decide favorably on it.

A large deputation representing many and varied interests waited on the Government. The speakers presented many good reasons why the railroad should be built. They touched briefly on reasons why Governments should encourage development of natural resources and devoted their attention chiefly to the merits of the particular area which would be served by a railroad from Westree to Swastika. They pointed out that three promising mining areas would be served by this 90 mile road. They told of the pulpwood and timber resources that would be tapped and of the areas of good agricultural land that would be opened up for settlement. The speakers covered the subject well and presented a strong case. If the Government investigates the statements made it will find that the presentation was a very fair one.

It is a fair assumption that the present Ontario Government wishes to have the natural resources of the Province developed. It is reasonable to assume further that the Government is willing to do something to assist in the rapid development of resources. The petitioners presented their case as one group of partners in an enterprise asking for the co-operation of another group. The men from the north did not come to Toronto to ask for favors, but to indicate how the Government may play a big part in the development of mineral resources in the area.

It is not for the benefits that the community will derive that men engage in mining enterprises. The men who formed the deputation asked for the construction of the railway because it would help them to make money. It is well known, however, that the efforts of those who develop mineral deposits for their own profit necessarily result in many and large benefits to the community. The men who develop mines take many risks because they have a chance of making large profits. Whether they are successful or not the community benefits from their efforts. The community holds the preferred stock, guaranteed against financial loss. The men who spend money in mining enterprises have no guarantee that they will get their money back, much less any profits. The workman and the merchant and manufacturer run comparatively small chances of losing money in mine operations. The Government assumes no risks; but takes a share of the profits if they are large enough to attract the attention of Government to gatherers. This profit tax is, however, a relatively small benefit to the Province as compared with the benefits which the people of the Province derive from the millions expended annually by mine operators for labor and materials used in the work. The people of the Province receive these benefits and the Government being cognizant of the fact must be desirous of seeing the industry grow and prosper.

Then comes the question as to whether the Government should be active or passive. In the latter case some progress will doubtless be made; but in the former case much greater progress will be possible. In the development of new areas the Government can greatly assist the pioneers by providing adequate transportation. The Government is asked to do this because the people of the Province will benefit. It is true that the prospectors and operators will derive direct benefits from Government assistance; but no assistance that will not benefit the whole community is being asked for. The object of development of mineral resources is purely one of gain. The Government is not asked to believe that the men who engage in mining are so engaged because it is for the general good. They are engaged in mining enterprises for the purpose of making money. They ask the Government to share with them in the development of mineral areas because it is in their special interest. Their justification for expectation of Government assistance lies in the fact that their particular endeavor to make profits from mining enterprises is bound to result in benefits to the community whether they make money or lose it. If the Government to secure these benefits for the people of the Province, will supply needed transportation facilities there will be developed many deposits that are now idle. Other Governments in many lands have actively assisted in mineral development and we may reasonably expect that the present Government of Ontario will take some active part in developing mineral resources.

COINAGES.

It is reported that the French Mint did not strike a single piece of gold last year, but 3,000,000 two franc, nearly 20,000,000 one franc, and 8,500,000 fifty centime pieces were issued, and considerably over 100,000,000 nickel and bronze coins were struck.

Some of the American states still seem to mint a certain amount of silver. The Colombian Government has been authorized to have three million dollars in silver money and one million dollars in nickel money coined and placed in circulation. If the variety and quality of the silver coins be identical with those minted in 1918, the amount of silver required would amount to about 2,170,000 fine ounces.—Samuel Montagnu & Coy's Circular.

REPORTED DISCOVERY OF OIL AND GAS NEAR THE PAS, MAN.

Following the recent reported find of lignite in the Pasquia Hills district of Northern Saskatchewan (see page 118 our issue of 25th February) is a report of the finding of gas and oil in the same region. Despatches from The Pas, under date of March 22nd, state that Dr. R. C. Wallace, the Commissioner of Northern Manitoba is going to the district to investigate, and that drilling syndicates are already being organized.

Successive Stages in the Development of the Storage-Battery Locomotive for Mine Uses

Several Steps in the Improvement of the Accumulator Loccmotive Have Been Made in the Last Few Years. They Probably Foreshadow Still Further Developments in the Immediate Future.

By J. APPLETON, Ironton, O.

Development of the storage-battery locomotive during the last five years has been rapid and marked by enduring improvement. This applies not only to the locomotives themselves, which have been bettered in design and broadened in facilities for operation, but also to the method of applying them to the gathering and hauling of coal in the mines. Consequently operators have come to look upon these machines in a more favorable way and have enough confidence in them to consider their employment well worth investigation when any extension or development is contemplated. The early mistake of applying these locomotives to uses for which they were not suited has been corrected, and valuable lessons have been learned from this experience.

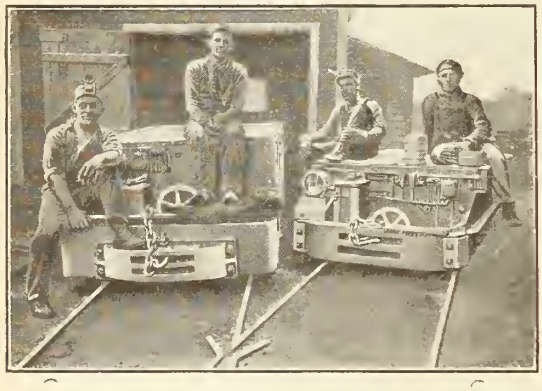


Fig. 1.—Two early storage battery locos. Still working satisfactorily after five years' service.

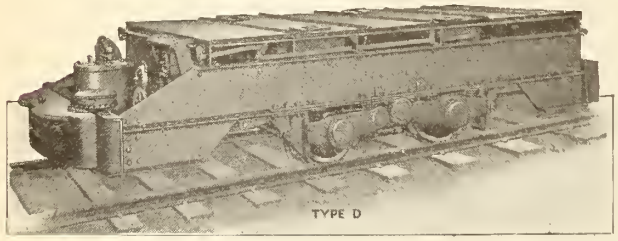


Fig. 2.—Low-type machine, equipped with radial housings and chain adjustment to compensate for wear.

Those who desire to keep up to date concerning modern practice in gathering and hauling coal should find much to interest them in a brief story of this development as shown by the experence of one of the several manufacturers in this line. From this can be obtained a good idea of the present and future status of the storage-battery locomotive in coal-mine service.

The storage-battery locomotive carries its own supply of power into the rooms and entries where no other source of energy is available. As the amount of energy that can thus be carried around is necessarily limited by the weight and chiefly by the space available (that is by the over-all dimensions of the vehicle) this machine must be so designed as to obtain the maximum results from this limited supply of power. Hence combined efficiency, mechanical and electrical, is of the utmost importance.

Operating where trolley-wire cannot be strung, or where the expense of its installation is prohibitive, the storage-battery locomotive replaces mules to great advantage. In some cases an additional saving is secured through not having to take down top or lift bottom to give the necessary height for these animals and their drivers.

For the purpose of this article the development of the "Ironton" storage-battery locomotive will be considered as typical of what has been accomplished by manufacturers during recent years in perfecting this

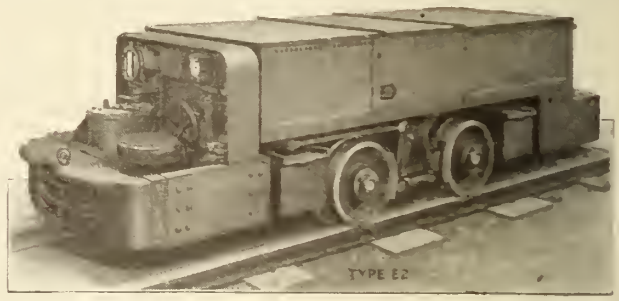


Fig. 4.—Narrow loco for use in restricted passages. Outside driver advantageous in removal of wheel.

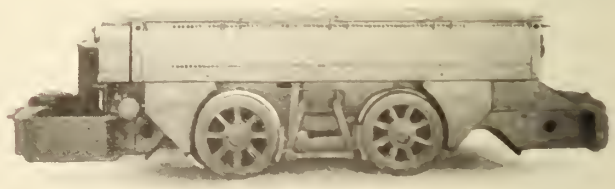


Fig. 6.—Gear-driven, storage-battery loco of large battery capacity. Both axles connected through worm-gears to single motor, and four wheels drive simultaneously.

means of applying electric haulage to the transportation of coal.

Fig. 1 shows two of the first Ironton machines of the storage-battery type. They were built in 1915 and are still in daily use and giving as good service as when they were installed. Of course the batteries, which were of the lead type, have been renewed. This picture shows both the low and the high machines. Both are chain-driven but are without the latter improvements that eliminated from this drive the difficulties and objection arising from lack of uniformity in the tension of the chain.

This difficulty existed whenever the locomotive was travelling over uneven track and other irregularities, for the warping of the support caused the distance between centers of the sprockets to vary. These later refinements also provided an easy and rapid method of taking up the slack as the chain gradually stretched from use and wear. These improved features are illus-

trated in Figs. 2 and 3. Both the low and high type of machine are again shown. The radial housings for the axle bearings and the eccentric adjustment for chain tightening are quite noticeable.

With increasing use of the storage-battery locomotive in gathering work, conditions were met which called for a type of machine that could be used in narrow entries or where timbers had been placed close to the track. The outside-wheel design met this situation admirably. It is shown in Fig. 4. The total width of this type is only a few inches greater than the track gauge.

Where the height will permit its use, the outside-wheel type has become popular, largely on account of the greater facilities for removing the wheels from the axles when such removal becomes necessary. A recent type of storage-battery locomotive introduces an entirely new feature—that of enabling the battery to be recharged while the locomotive is operating in an entry where trolley-wire is strung. This type of machine must not be confused with what is usually termed a combination locomotive, wherein a 250-volt trolley-type motor is used, both when the machine is operating with current from the trolley and when running on the battery.

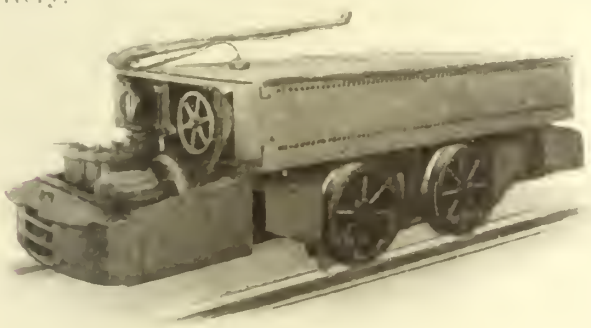


Fig. 7. Type that operates either as storage-battery loco. or trolley loco. All four wheels drive simultaneously, axles being connected through worm-gears to both battery and trolley motor.

In the type referred to a trolley-charging attachment is added to the storage-battery machine. This enables the battery to be replenished while running under a trolley. There are two advantages in this type of locomotive. Besides being able to do a limited amount of work on the trolley its scope as a straight accumulator machine is increased because of the additional battery capacity which is available.

This type of locomotive meets conditions under which the work is beyond the capacity of a gathering locomotive and yet is not of sufficient amount to warrant the installation of a main-line trolley locomotive. There also is the advantage of being able to charge the battery to some extent during working hours, thus reducing the time required to charge it afterward.

The latest development in design of storage battery locomotives for gathering and short hauls is shown in Fig. 6. Large battery capacity is available as the height has not been restricted to suit low coal.

In this type both axles are driven simultaneously by a single motor through worm gears. The drive shaft is direct connected to the motor through a flexible coupling, a universal joint being interposed between the worm gears. Experience and numerous tests have proven that accumulator locomotives in which each axle is driven by a separate motor do not develop the drawbar pull or tractive effort that can be obtained from machines in which the axles are connected and all four wheels are driven simultaneously.

As in the types previously described, all bearings are ball bearings; gears are fully enclosed in dust and oil-tight cases, and run in oil.

It is not expected that this type will supplant the chain-driven gathering types, which have been quite generally adopted. It will, however, be used in service where the chain drive is not as suitable as is the gear drive because of narrow-gauge track or other local conditions under which chain drive might prove objectionable.

Various attempts have been made to combine accumulator and trolley types in one machine. The chief objection to this type of machine was the extremely small battery capacity available and the low efficiency of the machine as a battery locomotive.

The first successful locomotive of the combination type is shown in Fig. 7. In this locomotive either the battery or the trolley may be used as the source of energy, each being independent of the other.

When used as a battery locomotive, the energy is supplied by a large-capacity locomotive-type battery (same number of cells as used for a straight-battery locomotive chassis of same weight) and a motor with windings suitable for the battery voltage. When used as a trolley locomotive, the energy is transmitted directly from the trolley to a 250-volt motor. In this design the low speed required for gathering is combined with the high speed desired for entry haulage. The axles are connected in the same manner as in the locomotive shown in Fig. 6 and all four wheels are driven simultaneously.

MONTAGUE GOLDFIELDS, NOVA SCOTIA.

Mr. J. Lindsay Allan, of London, representing an important British syndicate, has for the past three months been making extensive examinations and tests on the Montague Goldfields Company's properties at Montague. The tests have proved entirely satisfactory, as in addition to a 25 ton test from the "Skerry Lead," he has made tests from several leads in the south crossent at the 300 foot level of the main shaft. Two of the leads in question are illustrated in the Provincial Government's annual report on the mines of Nova Scotia, just published.

One of the leads is an entirely new discovery and has been named the "Coldstream." It is 26 inches in width and extends two miles in length and has been exposed to a depth of 200 feet. It is estimated that there is a quarter of a million tons of ore over this length and depth, tests of which gave nine dollars in gold to the ton. The ore from this lead can be mined and milled for about four dollars a ton.

The second important lead is the "St. Patrick," which like its adjoining lead "The Skerry" has now been proved to continue below the fault. It is 18 inches in width, and a test through the mill shows that it carries a gold value of about eighteen dollars to the ton.

Mr. Allan is leaving for London to complete arrangements for the erection of a new fifty stamp mill to handle this large body of ore. Concurrently with the erection of the new mill, electric power will be installed to operate the plant. In the meantime, preparations are being made to sink the main shaft which is now 300 feet deep, to a depth of 500 or 600 feet. Halifax "Chronicle."

NORTHERN MANITOBA'S GOLD FIELDS.

By REECE H. HAGUE, The Pas, Man.

The centre of prospecting for gold in northern Manitoba is the Wekusko or Herb Lake district, situated 100 miles north of The Pas, and reached from mile 82 on the Hudson Bay Railway by means of an eleven mile wagon road and eleven miles of water.

It was in the summer of 1914 that the first discoveries of gold were made in the district by a party of prospectors, most of whom are still in the locality, and who retain interests in companies which have been formed to take over some of the properties.

The Rex mine, situated at Herb Lake, is the only producing mine in Manitoba at the present time. It was discovered by a party of prospectors including J. R. Campbell, who is at present managing the mine for the company which is operating it.

The Rex was taken over in 1915 by Makeever Bros. of Boston and New York who also have extensive holdings in Mexico. Up to the present a sum of approximately $260,000 has been spent in exploration and developmental work on the property.

Makeever Bros. installed a Lane mill of 30 tons capacity and other machinery. For six months during 1918 the mill was operated and during this time $27,000 was recovered from the plates, and the concentrates sacked for future treatment. In December, 1918, the mine was closed down on account of the outbreak of influenza and unfavorable labour conditions. It was not until July, 1920, that operations were resumed and since that date work has been proceeding continuously.

The mill has only been running intermittently of late most of the labour being spent on shaft sinking. It is intended, when the shaft reaches a depth of 350 feet, to run the mill to capacity. The shaft is at present down to 280 feet being sunk at an angle of 70 degrees on the vein, which dips at that angle.

At the 100 foot level considerable drifting was done. Further drifting was done at the 210 foot level and will also be carried out at the 315 foot level. At the 100 foot level ore was removed by overhead stoping.

The vein, which runs parallel to, and some 200 yards distant from the lake shore, has been exposed for 1700 feet, the width at the surface and in the underground workings running from 2 to 20 feet. The strike of the vein is north east and the dip west. Values are uniform, averaging $20 a ton and improving at depth, the richest ore being secured at the 240 foot level where a porphry dike was encountered and some remarkably rich specimens secured.

A party of Winnipeg business men recently visited the Rex and other properties in the district. They went down the shaft and witnessed the mill operation and showed interest and appreciation of all they saw, returning to the city with many fine samples of free gold after a novel trip over lakes and portages, with the thermometer at 40 degrees below zero.

Half a mile from the Rex lies the Bingo property, on which sinking is in progress. The Bingo vein also strikes north east, and is thought by many to be a continuation of the vein passing over the Rex property. The vein on the Bingo has been traced for 1,400 feet and although small on the surface has strengthened at depth and the values improved, averaging, it is claimed $100 a ton.

Discovered the same season as the Rex, the Bingo was taken over in 1919 by a Winnipeg syndicate. No machinery, with the exception of a small engine to run the hoist, has been installed and shaft sinking has been carried out by hand.

The shaft is now down 150 feet and at 200 feet cross cutting will be carried out. It is intended to run some of the ore on the dump through the Rex mill at an early date.

It is anticipated that extensive work will be done on both the Rex and Bingo property this Spring and that machinery will be installed on the latter mine.

The show property of the district is the Northern Manitoba, about a mile from the Rex. No work has been done on this property for some little time but almost every piece of ore taken from the dump at the shaft head shows free gold.

The Northern Manitoba is controlled by a group of The Pas business men, the company being in a fairly good financial condition and it being their intention to resume work this spring.

A vein six to thirty inches in width has been exposed on the surface for 300 feet on the Northern Manitoba. A shaft has been sunk a hundred feet on the vein which dips 65 degrees east. Drifting has also been done and the quartz carries high values in gold in the fissures, associated with arsenopyrite and tourmaline. There is heavy arsenopyrite in the hanging wall to a width of six inches from the vein and here and there on the foot wall as well. On the south side there is a shear of 2 feet. For its width the vein is very persistent to the 100 foot level.

During 1918 a carload of ore from the Northern Manitoba was shipped to the Trail smelter and gave returns averaging $81.50 per ton. Machinery on the property consists of a 50 H.P. boiler, a three drill compresser-plant and a hoist.

The first discovery of gold at Herb Lake was made on the Kiski-Wekusko claims and was due to float being found on the lake shore and traced back to the Kiski. Three veins were stripped, and on one of them a vertical shaft was sunk to a depth of 53 feet. The width varies up to six feet and at the widest part of the vein north of the shaft the quartz is extensively cross-fractured.

Tourmaline occurs abundantly, mainly in irregular veinlets in the quartz. Copper pyrite, and occasionally galena, are found, but mispickel is the typical sulphide, occurring in places massive in the country rock. No. 1 vein has been exposed for a length of approximately 700 feet.

The company which controls the Kiski is a local one, and while no work has been done on the property for some considerable time, it is very promising and with the opening up of other claims in the district and improved transportation facilities, should make a mine.

The Apex group of claims have excited considerable interest. A dispute over the ownership is at present in progress in the Winnipeg Law Courts, an agreement for purchase having been made by a Winnipeg syndicate styling themselves the Mammoth Mining Company some time ago, and it being now maintained by the original owners that this agreement was not complied with, they are suing for a return of their property.

Professor R. C. Wallace, commissioner of Northern Manitoba, in describing the Apex group says that it is of interest in two respects. The claims are located well within the granite area, and the mineralization occurs, not in welldefined veins, but in a somewhat indefinite archlike zone. In what appears to be a line of weakness in the granite, extensive silification has taken

place, and arsenopyrite, pyrite and some chalcopyrite with gold have been deposited with the silica. The greatest width of silification is found in the Apex and Dawson claims, where the mineralized area has been prospected for 1,000 feet, the width averaging from 15 to 20 feet, with a greatest width in trenching of sixty feet. Values in channel sample are reported to range from $1.50 to $24.00 in gold. On the Discovery a pit has been sunk in a narrow quartz vein, the connection of which with the main vein cannot be traced owing to an intervening muskeg. Free gold is found in this vein. Eastwards from the Apex group and further from the contact, other quartz veins have been prospected. Such veins follow somewhat definitely the shear direction of the granite, and are of doubtful lateral continuity.

The Pas Consolidated Mines control the Dauphin-Elizabeth property, northeast of the Rex, on which a vein has been traced for 1,000 feet, which is six feet in width on the surface and three feet at the bottom of a 50 foot shaft which has been sunk on the property.

"This is a strong vein throughout, but the mineralization as disclosed on the surface, is somewhat sparing in arsenopyrite, chalcopyrite and galena" says Dr. Wallace. "Several veinlets have been discovered on the Elizabeth claims west, and one east, of the main vein. The country rock to the east is an acid lava, and to the west acid lava and coarse sediment."

A Winnipeg syndicate is at present engaged in stripping and trenching the Trapper group of claims, adjoining the Bingo.

The most northerly group on Herb Lake are the McCafferty claims, on which a double compartment shaft has been sunk on the vein at a point where the width is eight feet, including a horse two feet in width. The vein has been carefully stripped northwards for a distance of three hundred feet, and is said to have been followed for 1,600 feet. Four large shacks have been built on the property and a wagon road cut through to the lake facilitate transportation.

There are many other single claims and groups which show promise, and on which development work will no doubt be done, but space will not allow for a description of all.

Reference to the Herb Lake district would not be complete, however, without mention of a galena body which was discovered last summer, and on which stripping and trenching have revealed a very large body of ore carrying high values in silver and lead. Further work will be done on this property this summer, and the result is looked forward to with interest.

Other districts in Northern Manitoba in which promising gold properties have been discovered are the Copper Lake, Elbow Lake and Beaver Lake regions, in all of which good properties exist, and which will no doubt receive greater attention, when transportation facilities are afforded, but which are dependent to an extent on the building of the Flin Flon railway.

Beaver Lake was the scene of a rush in 1913, and while many claims have been allowed to lapse there are those who still cling on their properties in that district, convinced that it will come into its own in time.

Copper Lake was the scene of a spectacular high grade gold discovery on the Red Rose Claim owned by J. P. Gordon, which created considerable excitement in the Spring of 1919. A large amount of money was spent in diamond drilling a big dyke on Mr Gordon's property last Spring, and good gold and silver values were secured.

BOOK REVIEW.

ECONOMIC MINERALOGY.—A Practical Guide to the Study of Useful Minerals. By Thomas Crook, Chief of the Intelligence and Publications Section, Imperial Mineral Resources Bureau, London. 6 by 8½ by 1¼ inches. Stiff Buckram boards, 492 pp. with index. Numerous illustrations. Price, $8. Longmans, Green & Co., London and New York.

The aim of this book is stated to be to deal with the subject of mineralogy in such a way as to meet the needs of those who wish to restrict their attention to the utilitarian side of the subject. That is to say the book is designed to suit the needs of the practising engineer who requires to be informed as to the latest developments of the varied sciences that are included in the scope of the term mineralogy, but has not the time, and is under no real necessity, to equip himself with special knowledge of the individual branches. The work is a condensation of information not previously available in so convenient and digested a form. The chapters from one to seven deal respectively with crystals and their symmetry, the general physical characters of minerals, the practical elements of crystal optics, the chemical examination of minerals, the physical analysis of crushed rocks and loose detrital sediments, and the geology of economic mineral deposits. Chapters eight to eleven classify in alphabetical arrangement the useful minerals, and deals with them from the point of their economic uses. Each mineral is described, under the arrangement mentioned, as to its general, optical, chemical and blowpipe characteristics, with typical crystal forms and good illustrations. The three chapters are arranged into descriptions of Ore Minerals, Gem Minerals, and Miscellaneous Economic Minerals.

The concluding chapter consists of determinative tables, as follows:

1. Divided as to lustre into "metallic" and "Non metallic" groups, giving hardness, specific gravity, fusibility, colour, streak, and other characteristics.

2. Arrangement in order of specific gravity.

3. Arrangement as to colour.

Mr. Crook's work will undoubtedly be welcomed by a large class of readers that he refers to as "economic mineralogists" having aims utilitarian and economic rather than purely scientific. At the same time, Mr. Crooks has not by any means neglected the scientific aspect of his subject.

The book is excellently well bound, and is printed on thick, good-quality paper, and while the cost of the work is high, the cost of its production must have been also quite high. It can be confidently recommended. One interesting feature noted is the information given as to the origin of names given to minerals. The information as to the occurrence and distribution of each mineral described is complete, not only as to locality, but as to association with other minerals and nature of occurrence. The description of the Sudbury nickel deposit is a typical example of Mr Crook's ability to condense a good deal of accurate information in a very small compass.—F.W.G.

Graphite and Magnesite Industries in the United States During 1920

U.S. Geological Survey Reports Increased Tonnage but Decreased Selling Value.

The quantity of domestic flake and amorphous graphite sold by producers in the United States in 1920 amounted to 9,510 short tons, an increase of 28 per cent over the quantity sold in 1919.

The value of the graphite sold in 1920 was about $626,201, as compared with $778,857 in 1919. These figures are based on reports made by producers to the U. S. Geological Survey, Department of the Interior.

Operators in Colorado, Nevada, and Rhode Island reported sales of 4,694 short tons of amorphous graphite in 1920 at an average of $10.60 a ton. This was $3.52 per ton less than the average price in 1919.

The sales of crystalline graphite in 1920 amounted to 9,632,360 pounds, valued at $576,443, as compared with 8,086,191 pounds, valued at $731,141 in 1919. The average price per pound in 1920 was 5.9 cents; in 1919 it was 9 cents. Alabama led in the production of crystalline graphite, the sales in 1920 amounting to 4,894,648 pounds, or 51 per cent of the total quantity sold in the United States.

The sales reported from New York and Pennsylvania amounted to 3,552,687 pounds, or 37 per cent of the total in the United States, and the remaining 13 per cent was reported from California, Montana, and Texas.

The Acheson Graphite Co. reported the sale of 7,399,749 pounds of artificial graphite, which it manufactured at its plant at Niagara Falls, N. Y.

The domestic graphite sold during the six years 1915 to 1920 has been as follows:

	Short tons	Value
1915	4,718	$429,631
1916	8,088	935,471
1917	13,593	1,167,879
1918	12,991	1,524,254
1919	7,422	778,857
1920	9,510	626,201

Importations of graphite into the United States during 1920 were as under. The figures are subject to revision:

Country of origin	Quantity (short tons)	Value
Ceylon	9,204	$1,077,290
Madagascar	4,710	286,383
Canada	2,170	157,015
Mexico	3,659	131,832
Chosen (Korea)	810	29,936
Italy	137	5,072
Austria	58	1,195
Germany	30	2,502
Other countries	317	20,087
	21,095	$1,711,312

The Magnesite Industry in the United States During 1920.

The production of magnesite in the United States in 1920 increased 94 per cent in quantity over that of 1919. The entire output was made by two states, California and Washington. California mined 63 per cent more magnesite in 1920 than in 1919 and more than eight times as much as it mined seven years ago. Washington increased its production 109 per cent over that of the preceding year, making by far the largest output it has yet made. According to the United States Geological Survey, Department of the Interior, the total production of magnesite in the United States in 1920 was 303,767 short tons, which was valued at approximately 2,748,150. The following table shows the production by States:

Crude magnesite produced and sold or treated in the United States, 1913-1920.

	California		Washington	
Year	Quantity (short tons)	Value	Quantity (short tons)	Value
1913	9,362	$ 77,056	.....	.....
1914	11,293	124,223	.....	.....
1915	30,499	274,491	.....	.....
1916	154,259	1,388,331	715	$ 5,362
1917	211,663	2,116,630	105,175	783,188
1918	84,077	761,811	147,528	1,050,790
1919	50,020	504,973	106,206	743,442
1920	81,782	1,083,262	221,985	1,664,888

Most of the output of California was calcined and used as plastic material, only a small part being natural ferromagnesite used as a refractory lining of steel furnaces on the Pacific Coast. On the other hand, practically all the magnesite mined in Washington was dead-burned into synthetic ferromagnesite and used as a refractory lining of furnaces and smelters.

The largest producers of California were the Tulare Mining Co., and the Sierra Magnesite Co., at Porterville; the White Rock Mine, operated by Frank R. Sweasy, in Napa County, and the property of the Western material Development Company on Red Mountain, operated by C. S. Maltby.

The Northwest Magnesite Co., of Chewelah, Wash., was the largest producer in the United States. It shipped in 1920 more than 90,000 tons of dead-burned ferromagnesite, most of which was sent to steel companies and manufacturers of refractory product east of the Mississippi. The American Mineral Production Co., of Valley, Wash., sold its output crude to the Northwest Magnesite Co., whose quarries are nearby. The Western Materials Company operated the Double Eagle magnesite mine, near Valley, and shipped the calcined product to the American Refractories Co.

At the end of December, 1920, all the operations in Washington were stopped, principally, it is believed, on account of a lack of orders from the steel companies, many of which were idle or were not working full time. Some of the California producers were considerably discouraged at the end of the year on account of the high cost of labor and supplies, the high freight rates, and the competition of foreign material.

Imports.

The imports of magnesite in 1920, reported by the Bureau of Foreign and Domestic Commerce as calcined, not purified, amounted to 43,154 long tons, valued at $780,078. These imports came from the following countries:

Magnesite imported into the United States, 1920.

	Quantity (Long tons)	Value
Austria	...	$ 4
Germany	713	28,566
Italy	21,185	241,220
Czecho-Slovakia	3,829	126,827
Greece	4,000	38,418
Turkey in Europe	3,528	70,540
Netherlands	819	54,991
England	28	3,511
Scotland	190	13,720
Canada	6,028	184,060
Mexico	500	6,300
Venezuela	2,300	11,500
Australia	34	417
Straits Settlements	.....	4
	43,154	780,078

The magnesite imported from Italy was mined in Austria, and that from Czecho-Slovakia was obtained from the former Hungarian deposits. That imported from Mexico came from Santa Margarita Island and was calcined near San Diego, Calif. A shipment from Greece received in November was the first one to be sent from that country since 1916. The arrival of 2,300 tons from Venezuela in September, 1920, was a notable event, as the recorded imports of magnesite from that country are meager.

Although the quantity of magnesite imported in 1920 was nearly three times as great as in 1919, it was only about one-seventh of the quantity commonly imported before the war.

THE PRESIDENT OF THE CANADIAN INSTITUTE OF MINING AND METALLURGY.

An Appreciation of Mr. C. V. Corless, by the "Engineering & Mining Journal" of New York.

When the time came for decision as to what line should run at the top of this page, some doubt entered our mind. Is Mr. Corless a mining engineer or a metallurgical engineer, or does he belong in some of the newer classes such as "human" engineers or educational engineers? He qualifies for any of these titles, but we thought that "mining engineer" was the most all-embracing. Mr. Corless is another one of those Canadians: he was born on an Ontario farm in 1868, and has spent most of his life in his native country. His early years of manhood were occupied in teaching in preparatory schools, where he gained a reputation for his work in natural science, particularly biology. At the age of thirty, however, he had become convinced that progress along the lines which he had been following, and the fruition of his desires, required a separate income, which he did not command. No doubt feeling, therefore, as so many of us have, that digging gold out of the ground was a good way to acquire it, he decided on a course in mining and metallurgy at McGill University, in Montreal. In 1902, he was graduated with high honors, including a medal and a fellowship, and received the degree of B.Sc. in Mining.

In Canada, the summer vacations are longer than in this country, and the mining students almost invariably spend this time in practical work. One summer, Mr. Corless worked under W. A. Carlyle at the Le Roi mine at Rossland, B. C.; another was spent in the coal mines of Crow's Nest Pass; and his last "vacation" was spent in an inspection trip, with other students of his class, of the mines and metallurgical works of British Columbia, and in the preparation of a thesis on the geology and ore deposits of southern British Columbia. The year 1903 was devoted to graduate work under the Dawson fellowship, which he had received, the subject of his research being "Free Fall of Bodies in Water," a topic of great importance in the concentration and classification of ore pulps. For this work he won a Master's degree.

After leaving the university, Mr. Corless held his first position for only ten days. This was not because he was fired, however. The work he had accepted had been the inspection of railroad shops, and when he had the opportunity of examining some coal properties he lost no times in turning to his chosen profession. Many of our readers have heard the story of the man who was hired to kill some beavers which were damaging his employer's property. Joe had been on the job for some days with gun in hand, when friend Bill happened by to keep him company. Bill's bright eyes soon saw a beaver, but Joe was unmoved. "There he is, Joe; why don't you shoot?" he asked. "What do you think I am, Bill?" he replied, "that's the last beaver; and if I kill him I'm out of a job." Now, Mr. Corless, when he went to the given spot in British Columbia, had no trouble in deciding that coal was present, for he could see it; also that the seam was not workable, for that was equally evident. However, he lost no time in reporting his conclusions, and in a few days was again out of a job. This state of affairs was soon remedied, however, when he was offered an assistantship in the mining department of McGill. This was not exceedingly remunerative, but offered further opportunities for study.

A year later, in 1904, Mr. Corless, through his university friends, was given a position as mine superintendent for the Mond Nickel Co., the world's second largest nickel producer, and his connection with that company has continued to the present day. In 1908, he was made director and manager, and since that time has been actively in charge of hydro-electric development as well as the construction and operation of the Coniston smelter and an experimental flotation mill.

Besides his engineering activities, Mr. Corless has achieved a reputation as an educator and a welfare worker and has contributed many constructive papers to scientific societies and technical journals on these subjects. The latest honor accorded Mr. Corless is that of the presidency of the Canadian Institute of Mining and Metallurgy, a position which he assumed at the Montreal meeting early in March.

The peat fuel from the Alfred Bog is being used in Montreal with much satisfaction in open grates in conjunction with wood. The peat imparts a "body" to the wood, and gives a glow and heat that is cheerful. In burning, the peat gives off a pleasant odour, that to many people is an added attraction. It makes more ash than wood alone, but not sufficient to require too frequent removal of the ashes from an ordinary living room grate, and like wood ashes, the peat ash makes good fertilizer if used alone or mixed with leaf mould or manure. With hardwood becoming daily scarcer and, of course, dearer, there should be a good opening for peat fuel for open grate fires.

GENERAL DESCRIPTION OF STATUS OF THE MINING INDUSTRY OF KIRKLAND LAKE.

By J. A. McRAE, Cobalt.

The mines of the Kirkland Lake gold area, within the next sixty or ninety days, will be employing between 700 and 800 men, according to the present plans of the management at each of the proven mines.

The month of May is to witness the treatment of an aggregate of about 440 tons of ore daily, made up as follows:—

Company	Tonnage Daily
Kirkland Lake	140
Teck-Hughes	120
Wright-Hargreaves	120
Lake Shore	60
Total	440

To Treat 74 Tons Daily.

In addition to this, the companies mentioned will each proceed to increase the scope of their operations, while others will join the producing list before the end of the summer. As to this, the status of the industry at Kirkland Lake is being estimated as follows, as of the last quarter of the current year:

Company	Tonnage Daily
Wright-Hargreaves	180
Kirkland Lake	150
*Tough-Oakes	125
Teck-Hughes	120
# Lake Shore	100
Ontario-Kirkland	70
Total	745

Estimating an increase of 40 tons daily by increasing the grinding equipment.

The average grade of the ore to be treated is difficult to estimate. The average grade heretofore treated by the Lake Shore has been $25 to the ton. The Wright-Hargreaves is expected to average over $15 a ton, and the Lake Shore may be brought down to about $18 a ton. The Tough-Oakes is expected to average close to $15 a ton, while the Kirkland Lake, Teck-Hughes and Ontario Kirkland are expected to exceed $10 a ton. Were the whole tonnage treated to average $15 a ton, the daily output would reach about $11,175, or at the rate of $4,079,075 a year. Even though the average is brought down to a minimum of $12 a ton, the daily output would amount to $8,940 or at the rate of $3,263,100 a year. From these figures, careful observers are estimating an annual output at the rate of about $3,500,000.

These figures deal only with the mines with proven ore reserves, and do not take into account the other properties on which favorable developments are taking place. Neither do they include the Orr Gold Mines where a large tonnage of ore has been developed, but on which nothing has so far been done toward providing facilities for treating the ore.

Management of the Mines.

The management of each of the mines is in highly efficient hands, as may be seen by the following summary:—

Wright Hargreaves Mine, Albert Wende; Kirkland Lake, William Sixth; Tough-Oakes, or (Kirkland Lake Proprietary,) Charles A. Richardson; Teck-Hughes, D. L. Forbes; Lake Shore, R. C. Coffey; Ontario-Kirkland, Ralph Hurd.

The supply of labor is now entirely satisfactory, and the efficiency of the work has and is still undergoing an increase. Transportation is favorable and the supply of hydro-electric energy is adequate to meet all requirements.

Some Favorable Features.

A favorable feature in connection with the producing mines is the fact that Government geologists have been permitted to enter each mine, make surveys and examinations, and make public a general report which provides a means of studying the geological structure peculiar to each. The physical status of each property is quite well known to each mine manager and affords an opportunity to study all problems on a basis of correlation. This is of very considerable importance, and could only be added to by a presentation of statements by each company in relation to methods of ore treatment and experiments and the cost as applied to each department. By such comparison, some little rivalry would inevitably result—each perhaps endeavoring to establish a higher point of efficiency than the other, but the whole comparison and effort combining to create a maximum degree of efficiency in all branches of the work, whether in connection with mining or milling practice.

As yet, the Lake Shore is the only company which submits a monthly statement of progress and output. The other companies confine themselves to annual statements. As to this, however, some of the other companies are soon to offer more publicity. The correspondent of the Mining Journal has received official assurance that once the operation of the Kirkland Lake Proprietary is under way, a monthly statement may be forthcoming. The Ontario-Kirkland will also submit a monthly statement, following the completion of its mill, while the Wright-Hargreaves is also expected to consider such a policy once the mill is brought up to full capacity. The Kirkland Lake Gold Mines, and the Teck-Hughes have always been very frank about achievements at the properties and the results in their mills, and these two companies, too, are understood to be favorably disposed toward giving out a monthly statement. The reason for not having made a practice of this in the past at some of the mines has been due to the fluctuating conditions both in regard to labor and power supply, as well as the uncertainties caused by the adverse conditions arising out of the recent war.

A Leading Industrial Centre.

This summary is intended to convey a general idea of the status of the gold mining industry as found in the Kirkland Lake field. It goes to show that this field is the second largest gold-producing area in the Dominion, and is rapidly becoming one of the leading industrial centres of this part of Northern Ontario.

Another important point, without which a brief outline of the district would be quite incomplete, is the fact that the auriferous zone along which the proven gold-bearing deposits of commercial value lie, extends both East and West from the present producing section and offers excellent possibilities of considerable extension of activity, with very favorable prospects of additional mines being developed. The producing section, as yet, is confined to about two miles in length, and conservative mining engineers recognize the possibility of this length being ultimately greatly extended. Such is the proven merit of the field, and such are the enormous potentialities.

* To be known as the Kirkland Lake Proprietary (1919.)

GASIFICATION OF CRUDE LIGNITE.

In an article published in "Zeitschrift des Vereines Deutscher Ingenieure" on the gasification of crude lignite, the writer discusses the numerous failures which have arisen from the hasty erection of new works before awaiting the results of the experiments carried out in existing installations, and describes two of the processes said to have been adopted with success in Germany. It is pointed out that experiments have demonstrated the necessity of separating the different phases of lignite gasification—drying, distillation at low temperature, and gasification—in order to maintain the desired temperature, while at the same time reducing to a minimum the amount of heat consumed. Drying should be effected at between 100 degs. and 125 degs. C., distillation between 450 degs. and 550 degs. C., and gasification between 900 degs. and 1,000 degs. C. This separation of the processes assures a saving of heat in drying, a more thorough decomposition of the fuel in the distillation, and also the recovery of a greater quantity of tar. The foregoing fundamental principles are the basis of the two processes described in the article, the first of which has been introduced at the works of Thyssen & Co. The coal is dried and distilled in a tubular rotary furnace constructed according to the specification of the Institute of Coal Research at Mulheim, the operation of the furnace being based on the experience acquired by the coal distilling industry in Saxony and Thuringia. The temperatures are easily controlled, the resultant steam passing through a special pipe at one end of the cylinder, and the tar being recovered at the other end. The resultant coke is drawn of mechanically. The first experimental furnace was constructed for a daily charge of 50 tons of cannel coal, and was subsequently modified successfully for the gasification of crude lignite as delivered from the mine. The distillation gases which are not condensible are utilised for heating the furnace. The Thyssen works have now in course of construction a rotary furnace with a productive capacity of 100 tons per day.

The second process referred to is that adopted by the A. G. fur Brennstoffvergasung, a branch of the firm of Erhardt & Sehmer, the drying and the other operations being in this case carried out in separate apparatus. Distillation and gasification are effected independently, the apparatus for the last-named operation having a rectangular section and being provided with a movable mechanical grating. Distillation is effected in a special retort at a low temperature. It is stated that by this process it has been possible to treat successfully raw lignite from the Rhine and from Central Germany containing 50 per cent. of water, as well as peat containing 70 per cent. water, both classes of fuel being previously dried to reduce the water content to 25 per cent. One double gasification chamber will treat 40 tons per day; five similar double chambers treating 200 tons per day are sufficient to operate boilers having a heating surface of 800 square metres. The tar oil obtained by this process is stated to be very similar in appearance and composition to petroleum and to contain light oil (10 p.c.—25 p.c.), viscous oil (20 p.c.—35 p.c.), phenol (10 p.c.—50 p.c.), paraffin (5p.c.—25 p.c.), and pitch (5 p.c.—30 p.c.). Recent experiments suggest the presence of other useful materials in the tar. It is estimated that to obtain an amount of gas the combustion of which will furnish 10,000 calories, 7 kilos of lignite are required in direct gasification, 10 kilos when gasification is effected after previous compression, and 9 kilos when the gasification and recovery of tar are carried out by means of the new processes described. The amount of heat consumed in the production of one k.w.-hour is approximately equivalent to 6,250 calories in a gas turbine installation, including the amount of heat required to effect gasification. It is considered probable that the conversion of lignite into oil will lead to a more complete utilisation of this material; the oil is easily stored, and in view of its high calorific power it forms an excellent fuel.—"Mining Journal," London.

COAL AT KILKENNY, IRELAND.

(From London "Financial Times.")

A very encouraging step forward in the better development of the Irish coalfield has been made by the opening to passenger traffic of a new offshoot from the Great Southern and Western Railway main line to Castlecomer. The branch line extends over ten miles, and branches off Castlecomer Junction, between Kilkenny and Ballyragget. It was constructed during war time at a cost of over £100,000 for the purpose of getting much-needed coal from the Castlecomer Company's mines. Castlecomer itself lies in the midst of a rich and prosperous agricultural district, and hitherto it has been necessary to convey the coal by road to Kilkenny.

Probably the greatest importance of the opening of this new railway lies in the fact that it is symbolic of what might be happening all over Ireland if the Irish people once made up their minds to advance by their own economic efforts, instead of relapsing into unprofitable anarchy at the behest of the country's irresponsible youth.

As showing the productivity of the Kilkenny coal area, it may be remembered that the Royal Commission on Coal Supplies estimated that the coal still to be worked in the Leinster area was 180,000,000 tons. Last year, indeed, the output of three of its collieries was over 63,000 tons, and this year the output is expected to exceed that total. The Castlecomer Collieries, Limited, produce, in fact, two-thirds of all the coal mined in Ireland.

The daily output at the present time averages 400 tons. Two pits, the Eva and the Rock Bog, are now in operation, but a third will be producing largely as soon as the aerial ropeway to the leading station is completed.

About 600 men are employed in these collieries, and the coal to be handled economically throughout superior to, the best Welsh of that description. The installation of aerial ropeways, over five miles in length, from the pits to the railing point at Deerpark, four miles beyond Castlecomer railway station, enables the coal to be handled economically throughout.

Captain Wadesworth, the resident managing director expects that in the near future the demand may necessitate a delivery of over 500 tons daily in this way. This would be a small fraction of Ireland's total coal consumption, but a steady supply from a home concern must appeal to many Irish consumers during the next two years, when the English and Welsh coal mining industries are going through the turmoil of readjustment, with its concomitant inconveniences of fluctuating and uncertain supplies.

British Columbia Letter

La Touche, Prince Williams Sound.

The Girdwood Mine situated near La Touche, Prince Williams Sound, Alaska, is one of the most promising mining properties of the North in the opinion of W. A. Davis, the original owner, who has bonded his holdings on a royalty basis. He says that a 150-ton per day mill has been constructed. A slope has been driven from the beach a distance of 1900 feet and the ore body has been opened up to a vertical depth of 400 feet. The ore shoot is described as being 1000 feet long and in places 100 feet in width. The average assay returns is 2 6/10 per-cent copper, and in spots it runs to 4 per cent. The Girdwood is situated near the Beatson Mine, of the Kennicott Co., where there has been installed a mill with a daily capacity of 1600 tons a day, the concentrates going to the Tacoma Smelter. Mr. Davis expects that, as soon as market conditions become steadier, the Girdwood will put on a shipping basis.

Victoria B.C.

An announcement of exceptional importance to the mining industry was contained in the Budget Speech of the Hon. John Hart, Minister of Finance in the British Columbia Government. This speech was delivered a few days ago and Mr. Hart asserted that arrangements had been made to make allowance to mining companies operating in the Province for mine depletion in taxing their properties. For several years this concession has been sought but the government has not been able to see its way clear to concede it. The details of what it is proposed doing for the companies in this respect have not yet been placed before the legislature but further information is looked for shortly. It is felt that the attitude of the Administration will have an important effect. There is a possibility that the Hedley Gold Mining Co., for instance, might find it possible to re-open the Nickel Plate as a result because this Company adopted its present policy of inactivity on the ground that it was foolish to continue taking ore from the property, thus reducing reserves, when no allowance for depletion was made in the assessments and while operating costs were high and the purchasing power of gold extremely low. The relief afforded might be just sufficient to turn the scales. The same may apply to other mining enterprises. At any rate there is no doubt that the announcement of the Minister of Finance will be welcomed by mining interests throughout th Province and that further details will be looked for with some eagerness

The prospectors and mining men of British Columbia are being treated to lectures on the basic principles of mineralogy and geology by the government mining engineers. A. G. Langley, of the Kootenays, has been addressing large audiences at Cranbrook, Nelson, and elsewhere in his district. J. D. Galloway has been busy in the North and P. B. Freeland has been covering the Boundary Sections of the Province. W. M. Brewer also has a large district to cover. His addresses have been in Victoria, Duncan, Nanaimo, and Port Alberni. While the interest has not been particularly manifest in the larger cities there have been good-sized crowds out to hear the engineers in the smaller communities. All the engineers have described the minerals, their chemical composition, the peculiarities of the rocks of the various stages in the earth's development, and the methods of recognizing what are known as commercial minerals, as they occur in nature, in the simplest possible terms. It appears that the mining men appreciate the action of the Department of Mines in organizing these series of educative lectures. The Prospectors' Associations of Cranbrook and Nelson have spoken in the highest terms of Mr. Langley's addresses and the press of the Coast has commended the work Mr. Brewer is doing in his district. While it may be questionable whether the prospector is able to learn enough at these addresses (because they are necessarily sketchy, and superficial) to be of real value to him, there is no doubt that they are having the effect of stimulating a desire for knowledge and of bringing about a better understanding between the miner and the representatives of the Department of Mines in the field.

Cranbrook B.C.

The Southern Minnesota and the Washington Mining Company is planning to develop mineral claims, once known as the Lone Pine Group, which are situated on the summit of the ridge on the north side of the Similkameen river. They are on the international boundary line, a portion being in British Columbia; in fact the larger and more promising of the ore deposits have been found on the Canadian side. The ore body is reported to be extensive. Where the ledge has been opened up the ledge is ten or twelve feet wide and assays indicate that the ore carries strong values in silver, copper and lead.

Rossland B.C.

At a recent meeting of shareholders in the Molly Gibson Burnt Basin Mining Company it was decided unanimously to subscribe sufficient funds to permit the development of the property to continue. Officers were elected as follows: President, W. R. Bradent; vice-president, John B. Singer; general manager, M. E. Purcell; secretary, Irving J. Trembath; directors, M. E. Purcell, F. H. Jacobson, James Petrie, and John McNeely. The Molly Gibson is situated near Paulson and is considered to be a promising gold property

Nelson B.C.

It is considered a matter of first importance to the mining industry of the Kootenay Districts, British Columbia, that some facilities should be provided for the testing and treatment of complex ores. There are a great many varieties of this type of ore to be found in the eastern part of the Province. It was pointed out at the recent meeting of the British Columbia Branch of the Canadian Mining Institute that thousands of tons of ore were lying on the dumps because, owing to the penalties attached to its treatment by the smelters and because of the high costs and low market prices, it would not pay for shipment. Research work now is in process with a view to finding some simple economic method of handling the zinc content of such ores. J. R. Hunter, the member for the Slocan in the Provincial Legislature, dealt with this situation in an address before the Provincial Legislature and asked the Provincial Department of Mines to take cognizance of the seriousness of the condition. Now the Nelson Board of Trade has memorialized the Dominion Government, the request being that an ore-testing and treatment plant be installed at that point to facilitate the solution of the problem. In this memorial it is pointed out that a great many of the mine owners and prospectors are not in a position financially to undertake the experimental work necessary.

Mine operators are much interested in an announce-

ment that new freight-rates on zinc ores shipped to Midvale, Utah, and other smelters in that district become effective on the 1st of April. The changes apply to shipments from the Sloean, Ainsworth, and Lardo Districts of this Province. The rate will be $14 a ton when the ore value does not exceed $100 a ton and $16.80 when the value does not exceed $200 a ton.

Trail B.C.

Ore receipts at the Trail Smelter of the Consolidated Mining and Smelting Company from February 28th to March 8th inclusive totalled 8,107 tons. This brings the aggregate for the year up to the last date given up to 74,318 tons. Among the larger shippers among the independent properties were the Bluebell, Riondell, with 193 tons, the Horn Silver, Similkameen, with 232 tons, and the Paradise, Windermere, with 207 tons.

Grand Forks B.C.

It is stated by mining men interested in the Franklin Camp, near Grand Forks, that ores found in this zone contain the precious metals platinum, palladium, iridium, osmium, radium and ruthenium. The ore bodies also contain attractive values, it is stated in the base metals. The principal body in Franklin is a contact deposit of copper-silver ore, locally known as the Black Lead. On the government map by Drysdale it is shown to extend for at least four miles across the camp. Mining men of Franklin assert that the district contains the highest grade copper-platinum ores in the world.

Northern Ontario Letter

THE SILVER MINES.

The Cobalt District.

The market for silver continues poor, and the mines of the Cobalt district are marking time. The Nipissing, O'Brien, Coniagas, LaRose and Bailey are the only exceptions. These five companies continue to produce.

Under conditions where the cost of producing an ounce of silver is greater than the metal commands on the open market, directors show no inclination to continue the operation of mines. In 1920 the cost of producing silver from the McKinley-Darragh amounted to 85½ cents an ounce. There is nothing to indicate this could be bettered to any considerable extent this year, and it is obvious that with silver under 60 cents an ounce, it would be ruinous business to continue operations.

The fact is that when the cost of producing an ounce of silver reaches a point about equal to the value of the silver itself, and producers hoard silver, hoping to sell it a a higher price, it would really be better business for a mining company to close down, buy silver bullion from some other source and hold it for higher prices. In doing this, a company would not be exhausting its own resources on the gamble.

During 1920, according to the annual statement of the company, the LaRose properties produced 410,445 ounces of silver, the net value of which was $313,995. This compares with 289,317 ounces in 1919 valued at $356,124. Whereas the cost of producing silver in 1919 amounted to $1.05 an ounce, the company during 1920, by exercising extreme care and curtailing exploration work, was able to reduce costs to 73.27 cents an ounce. In spite of this care, however, the net profit for the year amounted to only $13,280. The company states that a number of outside properties were examined during the year with a view to purchase, but no development work was done on these outside properties, and no options are held. The general manager, G. C. Bateman, points out in the report that there are several sections of the original LaRose claim which will warrant further investigation, but that the work is not justified at the present time, on account of the low price of silver. Power shortage stopped work on the Violet claim and this has not yet been resumed. No discoveries of real importance were made on the Princess property; the known supply of ore being less at the close of the year than at the beginning, although a fair production is assured for 1921. In the new orebody located on the University, the values are made up of a substantial tonnage of medium-grade mill-rock in which high-grade stringers occurs.

At the annual meeting of the McKinley Darragh, the old directorate was re-elected. The meeting attracted an exceedingly small attendance. It was announced that the mine would remain closed until conditions were more favorable and profits could be realized by operating the mine.

The Board of Conciliation which has concluded its sitting in Cobalt, where the question of reducing wages by fifteen per cent was dealt with, was presented with evidence by the mine managers to prove the necessity for reducing operating expenses by every possible means in order to keep the properties operating. On the other hand, the employees presented evidence to show that the cost of living was greater than the wages would be if the cut went into effect. Evidence was contradictory in many instances. To those who heard the evidence, it became quite clear that one of two things would result, namely, either the mines would have to be permitted to reduce these costs or would curtail operations. In view of the dispute having arisen, however, the wage reduction announced for February 15th did not go into force pending the finding of the Conciliation Board. In an effort to adjust the dispute, the mining companies made a proposal, after the conclusion of the work of the Board of Conciliation, that former wages should be paid until the first of April, and the reduction of fifteen per cent then put into force. This offer was rejected by the employees, and the Board of Conciliation has been advised to proceed with the making of its report, although at one time it was thought agreement would have been found possible without this necessity. This action of the employees does not express any intention to prevent the enforcement of a reduction in wages, but they hope to defer it as long as possible.

A meeting of the newly organized Temiskaming Prospectors Association was held in Haileybury, March 26th, at which a constitution was drafted and officers elected. The object of this Association will be to win the general support of prospectors as well as mining men, for the purpose of advancing the welfare of the prospecting fraternity.

In regard to suggestions made by W. E. Simpson in a paper delivered at the recent annual meeting of the Canadian Institute of Mining and Metallurgy, having in mind the question of erecting public ore-treatment plants at central points in the mineralized areas of Northern Ontario, plans are being made to hold a meeting in Cobalt this week to which the local members of the Institute will be invited. Arthur A. Cole, mining engineer for the T. & N. O. Ry., and a former president of the Institute, is in favor of making inquiry into the the scheme and the matter will be discussed from all angles. At a later date, following the completion of preliminary plans, a general meeting of all those interested in such a scheme may be called for the purpose of deciding to what length the plan may be carried.

Elk Lake and Gowganda.

The question of improving transportation to Gowganda is a live topic in this district. The Government of Ontario has been criticized for having discontinued the construction of a macadam road. It has been urged to extend the Elk Lake branch to Gowganda and West Shining Tree with a view also to running a branch north to Fort Matachewan from Elk Lake. In certain parts of the press, the comment is made that in view of the Northern Light Railway Company having expressed its intention to build a light railway to Gowganda last year, the Government was justified in suspending the work of constructing a macadam road. However, the light-railway project appears to have fallen through, and the attitude of the Government is now being questioned. In Cochrane, the chairman of the T. & N. O. Ry., is stated to have announced that surveys towards the north were being resumed this Spring. It is stated some hope has been held out, of commencing next Autumn construction of the railway from Cochrane north to Kettle Falls., as a first step in the continuation of the main line to tidewater at James Bay. This would appear to indicate the intention of the government to direct attention to an extension of the main line rather than branches to such points as Gowganda and West Shining Tree. The attitude of the government towards these last-named districts is not altogether re-assuring.

ORE AND BULLION SHIPMENTS.

During the week ended March 24th, the LaRose was the only company to ship ore from Cobalt, this company sending out one car containing approximately 65,973 pounds.

During the corresponding period, bullion shipments were exceptionally heavy. The Mining Corporation sent out three shipments containing an aggregate of 197 bars weighing 200,064 ounces. The Nipissing shipments were even larger, amounting to 166 bars containing 220,643 ounces, as shown in the following summary:

Shipper	Bars	Ounces
Nipissing	166	220,643
Mining Corporation	197	200,064
Total	363	420,707

THE GOLD MINES.

The Porcupine District.

Although considerable rain has fallen, the general break-up has not yet set in, and the operating mines are still waiting for electric power. Rain, together with moderate winds from the south and a warm sun are combining to create a condition which indicates a rise in the water almost any day in the Mattagami river on which the hydro-electric power plants are located.

A meeting of the shareholders of the Porcupine-Keora is being held this week in Toronto for the purpose of considering a deal entered into by the directors with one of the large mining companies of Porcupine with a view to selling the Keora property. Assay plans and all data will be presented, and at the time of writing the prospects are very bright of the deal being consummated. In recent weeks, very little information has been obtainable in regard to the results achieved in the long cross-cut at the 250-ft. level where former diamond-drilling was stated to have indicated good ore-bodies. This week's meeting is expected to disclose information on the physical conditions of the property.

Development work at the 1,050-ft. level of the Dome Mines is unofficially reported to be such as to cause extreme optimism in regard to the future of the mine. Two bodies, each upwards of thirty feet in width, are stated to contain average values of well over $10 per ton. In some places the gold content exceeds $20 a ton, and the belief is being expressed that the Dome is steadily winning a place among the leading gold mines of the world, and that the results of operating the mill at full capacity on this higher grade of ore will be a quite favorable surprise for the shareholders. For instance, the mill has a rated capacity of close to 1,500 tons daily, but by conservatively estimating a daily average of 1,350 tons and a recovery of $7 per ton, the annual output would amount to approximately $3,449,250. Then estimating total costs at $3.50 a ton, which allows for a considerable increase over the pre-war figures, the annual net profits would reach $1,724,625. As against this, the company has an issued capital of something like $4,760,000, made up of some 476,000 shares of the par value of $10 each. These figures go to show that the indicated net profit of $1,724,625 would be equal to over 36 per cent annually on the company's total issued capital.

Interests identified with the Big Dyke Mining Company which controls what was formerly known as the McRae-Porcupine Mine, have secured an option on the adjoining Williamson-Forneri claims, in the township of Deloro. It is understood the company is making arrangements to resume exploration work at an early date.

Kirkland Lake.

Assay results just obtained from the King-Kirkland Gold Mines are favorable. The shaft has reached a depth of 80 feet at the time of writing, and twelve channel-samples taken across the vein at intervals of a few feet show an average gold content of $11.60 per ton. At the present point of operation the vein is the full width of the shaft. A small steam plant is being used, with which the shaft will be continued to a depth of 100 feet, at which point a limited amount of drifting and cross-cutting will be done. It is then proposed to turn attention to the "McGee" vein on the north side of the property and also sink a shaft there. Work throughout the entire Summer will consist of surface trenching and sinking shafts so as to determine the point most suitable for the installation of a large mining-plant and the sinking of a central shaft. The results as stated above are official.

The Queen Lebel is among the latest companies to be organized for the purpose of taking over and operating property in the Lebel section of the Kirkland Lake district. The company's property is situated immediately south of the east end of Gull Lake.

The Kirk Gold, a company owning property in Lebel township as well as in the Algoma district, has decided to commence work on its Lebel township claims. The two claims lie adjacent to the King Kirkland on the west.

The shaft on the Lebel-Oro has reached a depth of 50 feet, and commercial ore is stated to be showing in the shaft.

Arrangements are being made to resume sinking operations on the property of the Argonaut Gold, situated at Beaverhouse lake some twelve miles west from the producing section of the Kirland Lake district. The shaft was formerly sunk to a depth of 380 feet, with a station at the 350-ft. level. It is now planned to cross-cut at the 350 ft level to the known veins, as well as

to continue the shaft to a depth of 500 feet. During the course of this work, the ore taken out will be sent to the mill and a moderate production maintained. This will defray part of the expenses pending the completion of the exploration and development program, and the ultimate erection of a madern milling plant. The enterprise is being conservatively and efficiently managed.

Larder Lake.

Shareholders of the newly incorporated Canadian Associated Goldfields voted unanimously in favor of taking over the Associated Goldfields, Goldfields, Ltd., Harris-Maxwell and Tournenie properties in the Larder Lake district. Considerable friction exists, however, as between the control and the minority interests of the Goldfields, Ltd.

Boston Creek.

Orders have been received to suspend work for the time being on the Miller Independence Mines. It is not stated what object is in view, but a new plan of operation is understood to be under consideration.

TORONTO MINING STOCK QUOTATIONS.

Quotations on Active Stocks on Standard Stock Exchange for Week Ending March 23th 1921.

	High.	Low.	Last.
Adanac Silver Mines, Ltd. .	1⅞	1½	1½
Bailey	3¼	3¼	3¼
Beaver Consolidated	37½	37¼	37¼
Chambers-Ferland	7	7	7
Crown Reserve	15¾	15¾	15¾
Gifford	1¼	1¼	1¼
Great Northern	1⅞	1⅞	1⅞
Hargraves	1¼	1¼	1¼
La Rose	23	22	22
McKin.-Dar.-Savage	19½	17	17
Mining Corp. of Can.	1.00	1.00	1.00
Nipissing	8.80	8.70	8.75
Ophir	1	1	1
Temiskaming	27	27	27
Trethewey	15	14	14
Gold.			
Atlas	18¼	18¼	18¼
Dome Cons. Mines	18.25	17.45	18.00
Dome Extension	60	57	60
Dome Lake	3⅜	3⅜	3⅜
Gold Reef	3⅞	3⅝	3¾
Hollinger Cons.	6.95	6.75	6.90
Keora	18¼	15½	16¼
Kirkland Lake	49½	49	49½
LaBelle Oro M.	30½	30½	30½
Lake Shore M. Ltd	1.16	1.14	1.15
McIntyre	1.96	1.92	1.96
Moneta	11	11	11
Newray Mines, Ltd.	6.5	6.3	6.3
Porcupine Crown	21	20½	21
Skead	51	45	51
Porcupine V.N.T.	20¾	20	20½
Preston East Dome	3.2	3.2	3.2
Teck-Hughes	10	9	10
Thompson Krist	6¼	6	6
West Dome	7	6½	7
West Tree Mines Ltd	6¼	6	6
Oils.			
Ajax Oil	27	25	25
Eureka	20	20	20
Rockwood Oil, Gas.	4	3	3
Vacuum G.	20	9	10

MONTREAL METAL QUOTATIONS.

Following are fair average prices for ingot metals (in less than car-load lots) at Montreal:

	Mar. 23	Mar. 30
Copper Electro	17¼	17¼
Copper, Casting	17	17
Tin	35	35½
Lead	6	6½
Zinc	7½	7½
Aluminum	35	35
Antimony	7½	7½

TORONTO COAL PRICES.

Toronto, March 30.—Very little coal is moving and dealers continue to complain of lack of business, with a very light demand. Prices remain unchanged. Lump coal is quoted at $2.85 to $3.50 according to the mining district. Smokeless is $8.25 to $8.50, mine run and lump. Stove and nut are quoted at $8 net and egg at $7.50 net, while pea coal is selling at $6.25 mine prices, American funds.

PRACTICAL COAL MINING.—By George L. Kerr. Seventh Edition, 1921. Charles Griffin & Co., Ltd., London. Price sixteen shillings. 5½ by 7¾ by 2 inches. Stiff Boards, 778 pp. with index, 775 figures and diagrams.

Since this work was first published in 1900 it has gone through seven editions. It is a very practical work deals only briefly with the origin and geology Great Britain, and more particularly in Scotland. The work deals only briefly with the origin and geology of coal and the scientific aspects of coal substance studies, and devotes attention to the practical work of searching for coal and mining it. The chapter on "Sinking" is very complete, and reflects the much more difficult applications of shaft-sinking that have had to be tackled in British and European collieries when compared with the as yet shallow coal mines of this continent. In the same way, the chapters on Exposives and Mine Ventilation reflect the greater stringency of mine regulation across the sea. The smaller scope of the application of electricity to mine haulage and coal-cutting is also evident. The description of face conveyors, and the general adaptation of mechanical contrivances to the mining of thin coal-seams is good and complete.

The book is intended to meet the requirements of study for certificates of competency in coal mining in Britain, but it is not in any sense a "cramming" volume. With the proviso that the work deals fully and intelligently with coal-mining as practised in Great Britain, and does not cover some of the distinctive developments of coal-mining on this side—which in Canada seems more and more to reflect United States methods—the work can be recommended to coal-mining students without reserve.

The French Government has offered Italy six tons of coal per month for each Italian miner induced to go to France, and the Commissioner of Emigration of Italy is advising his people to emigrate to France. It is asserted that opportunities are better there than in America, both for steady work and high wages.

—F. T. Journal.

EDITORIAL

British Coal Miners' Strike

When the British coal miners went back to work in November last, no settlement had been arrived at except an understanding that a basis of co-operation would be worked out by the 31st of March with particular regard to the principle upon which surplus profits were to be dealt with. (*)

The issue at that time, and the issue at this time, is not one between the men and the colliery proprietors, but it is a constitutional question, and turns, in its essence, upon the extent to which private ownership is permissible.

The miners and the employers progressed in their negotiations a surprisingly long way. They had agreed that any surplus profit remaining after a minimum owners' profit (accompanied by a standard wage) should be divided between the miners and the companies. This is a step much in advance of anything ever seriously suggested in the coal industry on this side the Atlantic. It is very distinctly a limitation of private ownership, and admits a principle not hitherto conceded by employers in Britain. It would seem the employers had gone a very long way to seek conciliation.

The rock on which negotiations have split is that of national settlement of the wage question. Mr. Evans Williams, the president of the Mining Association of Great Britain, calls the difference between the miners and the employers one of fundamental economic principle. The men demand that "the whole industry shall be treated as one financial unit—just as if it belonged to one owner—all the profits and losses of the individual owner being pooled, and each receiving out of the pool a certain amount sufficient, presumably, to enable him to keep his colliery working without loss."

The coal owners are unalterably opposed to this principle, nor is it difficult to see why this should be the case. The miners desire to eliminate all the natural competitive features of the several British coalfields, and wish that an unremunerative colliery, say in the Forest of Dean, shall be maintained in operation out of the profits on the operation of a new colliery, say in the Yorkshire Coalfield. Mr. Evans Williams maintains that such a principle "would be suicidal to the industry." The reply of the Miners Federation to Mr. Williams's statement concurred in his explanation of the fundamental difference of opinion between the two contending parties. The miners insist on a national settlement. The owners state they "exclude the question of unification and a national settlement."

This is the issue, and it is a very grave one. The matters of de-control and subsidies are merely incidental to the main issue, which is the desirability and the feasibility of prosecuting a national "key" industry without regard to the cost of production or the necessity to conform to outside competition, fluctuations of demand and other expressions of the law of supply and demand hitherto regarded as immutable.

It is, of course, well-known that the miners' leaders hope to offset the question of foreign competition by achieving a world-wide federation of coal miners (and not coal miners only) and the explanation of much of their policy is to be sought for in the deliberations of the Miners Congress at Geneva. In this regard the attitude of the delegates from Canada and the United States towards the question of national control of raw materials at the conferences of the League of Nations is significant; as it reveals a distinct divergence of interest between European and American coal miners, arising from the superior competitive ability possessed by the coal industry on this side, based on coal resources that completely overshadow those of the rest of the world. Britain is threatened in her commercial supremacy by the superior natural resources of the American continent, now entering upon a stage of development that Europe cannot hope to rival. The British coal miner, hitherto, has been the mainstay of his country's commercial greatness. It is to be hoped he will not prove the main instrument in Britain's commercial declension, but it appears not unlikely to happen in that wise, because of a viewpoint that is not so much insular as European, and is chiefly mistaken in conceiving that the world revolves around Europe, when actually the balance of industrial power has shifted to the western hemisphere.

(*) For terms of agreement see page 943 issue 19th November.

NATURAL GAS CONSERVATION IN ONTARIO.

The bill now before the Ontario Legislature providing for control of the natural gas supply of Ontario by the Government is very thorough-going, but, under the circumstances of failing natural-gas supply in Ontario, the legislation is probably justified.

There is a subtle distinction between public ownership and public control that is difficult to define, but a good many well intended reforms have been wrecked, because this distinction has not been observed. Government control of public utilities is recognised as desirable, but public ownership of such utilities has proved disastrous in operation. The conservation of certain natural resources, such as oil, gas, transportation routes and water supply is apparently not possible except by government control. There is the exception, of course, that when private control achieves a monopoly on a national scale, the conservation of the resources controlled follows naturally, because the single and prudent vision of the monopoly takes the place of the divided and competitive viewpoint of many individual interests. The viewpoint of a government and the viewpoint of a complete monopoly are necessarily identical because, in each instance, one interest only is involved. This is why all really successful business connected with natural resources tends to develop towards unified control.

Public ownership, on the other hand, if accompanied by public administration, will necessarily fail, because a body that owes its existence and its continued life to a popular electoral vote, cannot in the nature of things administer questions connected with labour, wages and hours of employment. An elected government is not a free agent. It will—it must—subordinate equity to expediency, and it must seek votes, because it was created and exists by means of the vote. The ethical level of citizenship does not permit any elected government to pursue righteousness for righteousness's sake. It is possibly attempted, but it is never done.

The control of the private exploitation of natural resources by governments so far has proved to be the golden mean between the unrestricted excesses of individualism, as expressed through joint-stock corporations, and the equally unrestricted excesses of nationalization of resources, as expressed in communism.

Where the government is in fact the owner of a natural resource, and where individual rights have not been established, as is the case in regard to the petroleum fields of the Northwest, it would seem the part of wisdom not to repeat the waste of gas and oil that has taken place in Ontario, by permitting staking of many individual claims and the penetration of the surface cover of the oil accumulations by thousands of holes. Under the oil regulations of the Northwest, as they now stand, the location of the myriad holes that will be put down to tap the oil (presuming always that it is there) will not be guided by any co-ordinated desire to conserve the oil supplies, but will follow the well-known strategic rule of "getting there fustest, with the mostest men." The position that the government of Ontario now finds itself in is a fair indication of the position that the Dominion Government will eventually be forced into if widespread drilling follows the application of the new regulations. If eventually the Federal Government must assume control of the operation of the oilfields—as the technical advisers of the Ontario government believe Ontario must assume control—why not now? It is easier to punch an oilfield full of holes than it is to repair the damage that may result.

U. S. GOVERNMENT COAL QUESTIONNAIRE.

The Director of the U. S. Geological Survey has been instructed to question all large consumers of bituminous coal as to the stocks on hand at April first, as it is believed that consumers are unwisely burning up their reserves as was done in the Summer of 1919.

Wherever the questionnaire may be addressed to Canadian consumers it is advisable they should co-operate with the U. S. Government by answering at once.

The issuing of the questionnaire at this time is a significant commentary on the abolition of fuel control in Ontario, and on a rather premature announcement from Ottawa that owing to the comfortable fuel situation further expenditure on fuel organization is no longer necessary.

There will never come a time in central Canada when some form of fuel supervision will be unnecessary. The advice of fuel controllers and all the hard lessons of the past go for nothing as soon as the sun shines, and there happens to be more coal for sale than customers think they need. The United States Government apparently believes that actual ascertainment of the facts is better than mere assumption. That country has coal, and large parts of Canada have not. Can we afford to be less watchful than the United States?

THE DISCOVERY CLAUSE, ONTARIO MINING ACT.

Hon. Mr. Mills' Bill to amend the Ontario Mining Act was the subject of debate in the Legislature again on Thursday, March 31. The "discovery" clause was opposed by Hon. G. Howard Ferguson leader of the Conservative party, and by Malcolm Lang, Liberal member for Temiskaming. They argued that the prospector should not be asked to take an affidavit that he has discovered valuable mineral in place.

The "discovery" clause in the Mining Act has long been subjected to criticism. When a prospector stakes a claim he does not know whether his "discovery" is valuable or not. He thinks that he has staked a claim that may prove on exploration to be found valuable and he is ready to spend some time and money in finding out what he can about the mineral deposits on his claim. He knows from experience that he cannot do the necessary work to prove value before he stakes his claim; but that he must swear it is valuable in order to obtain the right to find out whether it is valuable or not. The "discovery" clause doubtless had some good results at Cobalt in the early days of prospecting there, for it made the prospectors dig feverishly in order to obtain

title to property which they considered valuable. But the same clause led to much trouble also and has ever since the boom days at Cobalt been a source of annoyance to the prospector. His own interest demands that he search for valuable minerals on his claims and if he is willing to search he should not be made to swear that his discoveries are valuable. It takes a long time and a lot of money to determine whether a mineral discovery is valuable or not. When a prospecter stakes a claim no man can demonstrate that the minerals on it will be profitably worked and until that has been demonstrated no one knows whether the deposit is valuable. Consequently the prospector is forced to conclude that the affidavit of discovery is merely a matter of form and that it is so commonly so regarded that he is justified in taking the affidavit as soon as he has found a little outcrop which might possibly on development prove to be a valuable mineral deposit. So with an easy conscience he takes his axe and squares posts and blazes lines around the forty acres he wants. But every time he records a claim he wishes that the Government would not insist on that discovery clause.—R. E. H.

MINERAL STATISTICS.

The Editor gladly includes in this issue a letter from Mr. R. H. Coats, the Dominion Statistician, which, very fairly, sets out the scope of the Dominion Bureau of Statistics. This is, in brief, as stated in Mr. Coats's letter, namely, "the co-ordination of statistics as a national system. . .planned as a harmonious whole". Mr. Coats also refers us to the first annual report of the Bureau for year ending March 31st, 1919, where, in regard to mining statistics, it is stated that those in existence before the formation of the Dominion Bureau of Statistics "are of good quality, but the methods followed are often at variance, and they are limited to the mining point of view."

It is not, in our opinion, possible to coordinate industrial statistics as a harmonious whole, as technical statistics are essential parts of specialized departments, and are inherently incapable of segregation or of being usefully coordinated. Mr. Coats is perfectly correct in stating that the mining statistics of the Department of Mines are limited to the mining point of view, and, if we did not mistake the spontaneous expression of opinion at the Institute Meeting in Montreal which followed Mr. McLeish's valedictory presentation of the mineral statistics for 1920, it is the desire of the mining industry to continue this limitation. Specialization of effort is the very essence of departmentalization in governments, and, until departments themselves are found unnecessary, we do not see any logical reasons for relieving any department of any phase of its administrative activities.

Mr. Coats's expresses the desire to co-operate with the industry, and his fair minded defense of the ideals of the Bureau which he directs will, we are sure, not be met in any captious or controversial spirit by mining men. If mining officials should oppose transference of the compilation of mining statistics, it is not because the aim of the Bureau is imperfectly understood; but because those who have been most in the habit of relying upon these statistics believe the idea of co-ordinating technical statistics under the plan known as the "Industrial Census" is an impracticable one, inasmuch, as in attempting to meet a supposed public demand in statistical information, it may vitiate the specialised character of technical information, as conceived by the designedly limited vision of mining students.

CORRESPONDENCE.

DOMINION BUREAU OF STATISTICS.

Ottawa, 26th March, 1921.

Mineral Statistics.

Dear Sir,—Your editorial of March 11th was written I think under some misapprehension as to the method of collecting Mining Statistics recently instituted by the Dominion Government.

First, the statement that the transfer of certain activities from the Mines Department to the Bureau of Statistics represents the over-riding of an Act of Parliament by an Order in Council is not descriptive of the facts. The Mines Department has an instruction to collect Mining Statistics, but the Bureau of Statistics has an even more explicit instruction to the same effect, and is given final power to carry out this instruction. Moreover, the general co-ordination of statistics as a national system is vested in the Bureau. The Order in Council was passed under the Statistics Act and Regulations, which lay down the following principles, namely, (1) that the official statistics of the country should be planned as a harmonious whole; (2) that in the numerous cases where the statistics of a subject are of concern to a particular department or to several departments the method of collection, compilation, etc., shall be matter of conference between the bureau and the departments concerned—the Bureau to report a plan to Council which on ratification becomes the *modus operandi* for the field in question. The present Order in Council is one of several that have been passed to define statistical relations and organization within the Government, covering such fields as agriculture, the fisheries, forestry, central power plants, railways, trade, etc., etc., all of which are working admirably, and have brought the statistical activities of some 33 Departments into team work. It aims at the clearing up of overlapping jurisdiction and the consolidation rather than the duplication of work—which is the opposite of what you fear.

There is a misunderstanding also in the inference that mining statistics are to be divorced from the Mines Department. The Bureau of Statistics becomes the collecting agency for mining statistics, but by the Order in Council the data collected are entirely at the disposal of the Mines Department, in any form the latter may prescribe, though such data will at the same time be made to conform to general statistical requirements, so as to relieve the mine operators from repeated requests for information, and so as to bring the statistics of mining into relation with the general economic survey of industry now carried out annually by the Bureau. In other words the "Mining Metallurgical and Chemical" Division of the Bureau is *de facto* and *de jure* at the command of the Mines De-

partment. In view of the speed which is necessary in getting out the preliminary annual report on mining production the report in question will probably be prepared in the Bureau of Statistics, but the final annual report on Mining Statistics will be a joint report of the Mines Department and the Bureau.

It is the hope also to work out a plan of co-operation with the Provinces whereby data may be interchanged on certain points and some duplication of work and conflicting statistics avoided. This is a many-sided problem, but I personally believe that closer relationships are feasible and could be made mutually advantageous. We have already, since January, 1920, a scheme of co-operation on monthly coal statistics with the Mines Departments of Nova Scotia, New Brunswick, Saskatchewan and Alberta whereby a joint form is used and provision made to eliminate duplication of collection, compilation, etc. A half-dozen of such arrangements would probably cover the main features of mining, and would in my judgment represent improved statistical organization.

No one could more highly appreciate than I the good work that has been done by the Mines Branch in the past. That work, of course, will not be interrupted (the same staff would have been employed had not the Mines Branch desired to retain them for other work), but there will be brought into immediate relation with it a large amount of subsidiary data of various kinds, and there will be placed at its disposal an increased organization for the analysis and elaboration of results. Intensive work in particular fields will be facilitated. If a project of this kind is opposed, as you say, by the mining industry, it can surely be only because the aim is imperfectly understood.

I trust you will not regard this letter as controversial. It would be unfortunate for the Bureau to carry on this work in an atmosphere other than that of cordiality on the part of those who will be affected by it, and I therefore leave it to your judgment as one fully seized of the supreme importance of co-operation and goodwill as adjuncts in getting out good mining statistics as to whether or not it should be printed. Had I known the question was to be discussed at the meeting of the Mining Institute I should have asked the privilege of a hearing for the Bureau's point of view.

Yours faithfully,
R. H. COATS,
Dominion Statistician.

The Editor,
Canadian Mining Journal.

MEXICAN GOVERNMENT RELIEVES SILVER MINES OF ALL TAXATION.

In view of the action being taken by the Ontario Government in the increased taxation on the mining enterprises of the province, information contained in Mexican papers just to hand in Toronto is of interest. In Mexico, in order to save the silver mining industry to the country, the Government there has decreed exemption from taxation on mines producing silver: exemption from customs duties on importation of explosives, machinery and supplies used in producing silver; exemption from taxation of a consular invoice, and adjustment of freight rates to the point 1910, or about fifty per cent of ruling rates. The production tax of five per cent is abolished as long as silver is below 60 cents per ounce.

CANADA'S GOLD PRODUCTION INCREASINGLY IMPORTANT TO THE EMPIRE.

The following quite interesting item is culled from Messrs. Samuel Montagu and Company's circular for 17th February.

"In a very interesting paper read on the 15th inst. before the Royal Statistical Society, by Mr. J. Bonar, LL. D., Late Deputy-Master of the Royal Mint, Ottawa, dealing with the Mint and the precious metals in Canada, the following remarks were made:— 'Contenting ourselves with what it known and consulting the large maps of the minerals of Canada published by the Dominion Government, we find quartz gold along the eastern coast of Nova Scotia, a small patch in the Beauce County of Quebec, a large tract mainly quartz in the Porcupine district of Northern Ontario, some patches between Lake Superior and Lake Winnipeg, traces of alluvial gold in Saskatchewan river, copper matte with gold in it at Rossland, British Columbia, near the frontier, alluvial gold in various rivers of British Columbia, as well as in the north corner of that Province at Atlin, and finally the Kluane district and the great field alluvial gold in the Klondike region of the Yukon Territory.'

"It is interesting to notice that Canada is drawing gold from quartz as well as from alluvial sources, and from points as much as 2,000 miles apart. Considering the poor extent to which the vast territory of Northern Canada has been prospected, it is reasonable to expect still more important discoveries, which in view of the lessening product on the Rand would be particularly valuable to the Empire."

We would comment that alluvial gold is not now an important feature of Canadian returns, and that production from rock-ores is, in the most conservative opinion, only just commencing.

ACETYLENE BLOWPIPE FOR REMOVING IRON FRAGMENTS FROM ORE CRUSHERS.

From the Engels Copper Mining Company, Engelmine, California, comes the information that this Company uses the oxy-acetylene cutting blowpipe for removing "hammers" and other "tramp iron" from ore crushers. "We have found this the quickest and easiest, as well as the cheapest way to cut the hammers out of the gyratory crushers" the Company writes.

Practically every mine, large and small, has as a part of its equipment a coarse crusher of some sort. Run-of-mine ore is fed to these crushers, and, even with the utmost precaution, hammer heads and other pieces of metal become mixed with the ore and get into the crushers. Where no preventative devices are used, foreign matter of this kind gets into the crushers quite frequently, and if not removed may damage or seriously interfere with the operation of the equipment.

The experience of the Engels Copper Mining Company suggests a fast, cheap and effective way of handling a difficulty that has been a source of more or less constant trouble in mining plants everywhere.

MONTREAL BRANCH C.I.M & M.

The Montreal Branch of the Canadian Institute of Mining and Metallurgy will meet in the Y.M.C.A. Building, 127 Drummond Street, Montreal, at 8.30 p.m. Wednesday, April 13th, when moving pictures of operating mines will be shown.

Revolving Screens

JOHN S. WATTS, New Glasgow.

The action of a revolving screen, in relation to the quantity of material that can be handled by a screen of a given size and speed, is dependent upon a number of variable factors, each of which vary the effect of the other factors, as will be seen by what follows. It is therefore impossible to give an empirical formula from which to calculate the capacity of a screen, which may explain who so little data has been published on this subject.

However, a study of the operation of the revolving screen, will enable us to state the basic laws upon which it works, and from them we can, given the nature of the material to be handled, arrive at a close approximation to the actual delivery that can be expected.

In any kind of screen the capacity is effected by the nature of the material being screened, particularly as to the freedom or otherwise with which the fines separate from the coarser particles. The relation between the percentages of fine and coarse material will vary the area required for a given capacity, and these factors combined govern the area of the screening surface required, just as it would in a flat screen, but in the latter, if the stream of material is the full width of the screen, the material, (which does not fall through) travels the full length of the screen, and the whole area is utilized to the full. On this account it is possible to find by test the capacity per square foot of flat screening-surface, for a given material, and to make a screen for a given quantity per hour, for the same material, simply means providing the area calculated from this basis.

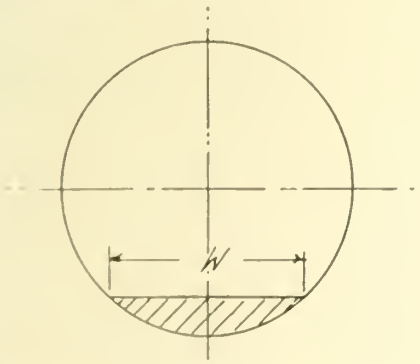


FIGURE. 1.

In other words it is possible to state that a given quantity, of a certain material, can be screened per square foot of screen with given perforations, provided only that the material is delivered to the screen in a stream the full width of the screen.

In a revolving screen, the question is complicated by variations in the diameter of the screen, its inclination, and its speed, all of which must be made to suit the quantity and nature of the material to be handled over and thro it, and it is obviously incorrect to assume that the whole area of a revolving screen, will in terms of capacity, bear any fixed relation to an equal area in a flat screen.

This is because in the flat screen, every part of the screen, is in action all the time, (when working to full capacity) whereas in a revolving screen, only that part of the screen, which is at the bottom, and is covered by the stream of material, is in action. On the other hand, in the revolving screen, not only is the material travelling longitudinally along the screen, but the screen itself is also travelling under the material, and causing the stream of material to traverse an area of screen, the total of which depends upon the diameter and inclination of the screen.

The effective screening area, of a revolving screen, or that area from which we may expect the same results, as from an equal area in a flat screen, is the width of the stream of material, passing through the revolving screen, multiplied by the length of the line travelled over the surface of the screen, by a piece of the material which does not fall through the perforations.

In the revolving screen, the width of the stream, as it is delivered onto the screen, is of no importance, as the action of the screen will spread out the material, until its upper surface is practically level as indicated in Figure 1.

Knowing the quantity of material to be handled, per hour, we must to find the width W, of the screen, decide on the speed of the material longitudinally along the screen.

This speed is a function of the diameter of the screen, its angle of inclination to the horizontal, and its revolutions per minute.

As the diameter and inclination of the screen also effects the length of travel of the material over the perforations, and therefore the effective screen area, it follows that we are compelled to adopt certain dimensions as a trial, and from the result cut and try, until we arrive at a satisfactory combination.

The distance through which a particle will travel, in a half a revolution is indicated in Figure 2, the action being as follows, starting with a particle at point 1, at rest relative to the screen, this particle will be carried upwards by the screen, to point 2, when it will slide downwards to point 3, and repeat the process again. A study of this motion will show that the particle advances, during one half a revolution an amount equal to the inclination per foot, multiplied by the diameter, or, L, in Figure 2. This assumes that the downward travel is instantaneous.

While the downward travel is not, in actual fact, instantaneous, the particles, owing to the friction of motion being always less than that of the rest, travel further down the screen than point 3, so that the actual advance is practically equal to that shown.

We may take it then, that the speed of the stream along the screen, longitudinally, is equal to the diameter of the screen, multiplied by the inclination per foot, and by twice the revolutions per minute, or expressed as a formula,

$$V = D \times L \times 2 \times R$$

Where V = Velocity in feet per minute
D = Diameter of screen in feet
L = Inclination in feet per foot of length from the horizontal
R = Revolutions per minute

As already shown, we must assume values for D, L & R, and cut and try. The points to remember are as follows.

Diameter.—Increase of diameter, other factors being the same, will increase velocity, and therefore increase capacity to convey material. Also increases

width of stream, making a greater percentage of the screen area to be effective, but this is partly counteracted by the increased velocity longitudinally, shortening the length of actual travel over the perforations. Increases the first cost, and horse power consumed in operation.

Inclination.—Increasing the inclination, will increase the capacity of the screen, regarded purely as a conveyer. Reduces the effective percentage of the screen area. Increases the horse-power consumed.

Revolutions.—Increasing the speed, will increase the capacity of the screen as a conveyor, without effecting any change in the percentage of effective screen-area. Increases the horse-power consumed.

In practice there are certain limitations, which experience has placed on each of the above factors, as follows,

Diameter, may be anywhere between 30 inches and 120 inches.

Inclination, is generally made between 2 inches and 2½ inches per foot, from the horizontal. Some makers prefer to get the inclination by making the screen itself tapering, forming the frustrum of a cone, which has the advantage of keeping the shafting and supporting-frame horizontal, but involves more difficulty in the manufacture of the conical-shaped screen.

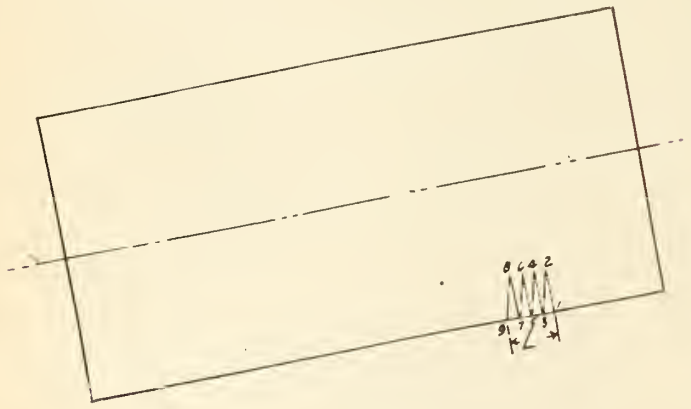


FIGURE. 2.

Revolutions, per minute, should be such as to keep the peripheral speed of the perforated screen between the limits of two to three-hundred feet per minute, the lower limit being preferable.

Having arrived at a tentative velocity of the stream, we can can calculate the width of the stream, by dividing the cubic feet of material (the total amount) to be screened per minute, by this velocity in feet per minute. The quotient will be the area of the stream, from which, knowing the diameter of the screen, we can find the width of the stream, W, in Figure 1.

Assuming that we know, or can determine by test, the capacity of a square foot of flat screen, of the mesh, and for the material in question, we can calculate the effective area required for the quality of material to be handled. This capacity varies so much, for the different materials, and sizes of perforations used, that it would take up too much space to attempt to tabulate them here, bu this information can generally be determined by reference to text books on the trade using the material in question.

Having the effective area required, if we divide this area by the width of the stream in feet, we will have the length of travel across the perforations, necessary to give this area.

A little study will show that the material travels in a spiral course relative to the screen surface, the pitch of the spiral being 2 x L, (Figure 1) in one revolution. The length of this spiral line, in one revolution, will be equal to the hypothenuse of a triangle whose base is equal to the circumference of the screen and whose perpendicular is equal to 2 x L, or expressed as a formula, the travel per revolution longitudinally will be

$$\sqrt{(2L)^2 + (\pi D)^2}$$

This distance per revolution is accomplished while the stream advances the distance 2L, and therefore if we divide the total travel required by $\sqrt{(2L)^2 + (\pi D)^2}$, and multiply this by 2L, we have the length of screen required. For all practical purposes, it is near enough to take the travel over the screen per revolution as being equal to the circumference of the screen, and this simplifies the calculation, the length of screen required then being P, we have

$$P = \frac{X \times 2 \times L}{\pi \times D}$$

Where X = length of travel over screen required L and D as before.

If this length is too great, we must increase the diameter, or decrease the inclination, or both, and check up the velocity of the stream again, to ensure that the thickness of the stream will not be too great to ensure effective screening.

The maximum thickness of stream depends entirely upon the class of material being handled, as if only a small percentage of the material will pass through the screen, the thickness should not be over say 6 inches, or even less if the fines adhere to the coarse. If a large percentage of the material will pass through the perforations, and the fines separate freely, the thickness can be increased up to 18 inches, as the stream will thin down rapidly as the screening progresses.

TAXATION OF MINES.

Commenting on the proposal to increase taxes on mining profits in Ontario, an editorial in the March 5 number of Mining and Scientific Press, of San Francisco says: "The prosperity of Northern Ontario depends upon its mines, and any legislative enactment that tends to discourage investment in mining property will retard the development of the industry."

The Natural-Gas Conservation Act of Ontario

(Prècis of a government bill introduced 23rd March, 1921.)

The Minister of Mines of Ontario has introduced a bill into the Legislative Assembly of Ontario which was read for the first time on the 23rd March. The salient provisions of the draft act are as follows:

The Minister shall control and regulate the production, transmission, distribution, sale and disposal and consumption of all natural gas produced in Ontario, and for that purpose shall have and may exercise the powers and duties specified. The Referee shall have and may exercise the original jurisdiction provided herein, as well as the appellate jurisdiction specified. Each shall have due regard to the provisions of any general or special Act or Letters Patent, or any agreement, franchise, bargain or arrangement whatsoever and by and between whomsoever made, but he shall have power to depart from or vary such provisions where he finds by enquiry that such action is necessary for conserving the supply or prolonging the service to consumers or furthering the search for and development of new sources of supply of Natural Gas.

It shall be a good and sufficient defence to any action or other proceeding brought or taken against any person producing, transmitting or distributing or selling natural gas that such person so far as regards the act or omission which is the subject of such action or other proceeding has conducted the production, transmission, distribution or sale of natural gas in accordance with the order or direction of the Minister or Referee, but no order shall be made which shall have the effect of destroying or suspending or limiting the contractional rights of any person or persons, company or corporation without such notice as the Minister or Referee may deem proper having first been given to such person or persons, company or corporation and without their being given a reasonable opportunity to present their claims to the Minister or Referee.

The Minister shall make such orders or regulations and give such directions from time to time as he may deem proper for the due conservation of the supply of natural gas in Ontario and its transmission to and distribution in such localities and to such consumers, for such periods and at such times as, in the opinion of the Minister, may best serve the general public and particularly the users and consumers of natural gas for domestic purposes.

The Minister may make orders or regulations for:

(a) The closing and cutting off of the supply of natural gas to any corporation, company or individual.

(b) The construction, alteration or use of any works, machinery, plant or appliance in and for the development or consumption of natural gas.

(c) The cutting off of the supply to consumers generally or to any consumer or consumers in any locality for such periods or at such times as he may deem proper.

(d) The limiting or restricting or taking away any right conferred upon any person to the use and consumption of natural gas without charge for the payment of such compensation to such person as he may deem proper in respect of such limitation, restricting or taking away.

(e) The allotting or supplying of gas to consumers or persons generally or to any consumer or consumers, person or persons in any locality for such periods or at such times as he may deem proper.

(f) The closing down and stopping up of any natural gas well or any works for the production, transmission, distribution or supply of natural gas.

(g) Requiring returns to be made by any person producing, transmitting or distributing natural gas and for prescribing the form of any such return, the particulars to be included therein and the intervals at which such returns shall be made.

(h) The appointment of such officers, agents, servants or workmen as may be necessary to carry out and enforce any order made by him under the Act.

(i) Compelling the installation of such appliances by consumers of natural gas, as he may deem requisite for preventing waste.

(j) Generally for the better carrying out of the objects and purposes of the Act.

The Referee may make orders for:

(a) Fixing rates to be charged for natural gas.

(b) Compelling the owner, lessee or licensee of a pipe-line to take gas produced by any person or corporation at such price, in such quantities and on such terms as may be fixed by the Referee.

Licenses may be issued by the Minister upon such terms and subject to such conditions, and upon the payment of such fees as the Minister may prescribe, to persons for boring, prospecting for, transmitting or distributing natural gas, and no person whether or not he is the holder of a license, lease or permit from any person or authority other than the Minister, shall bore or prospect for, produce, transmit or distribute natural gas in Ontario, who is not the holder of a license from the Minister permitting him so to do.

The Lieutenant-Governor-in-Council may appoint an officer to be known as the Natural Gas Commissioner.

Subsequent clauses provide for remuneration of the administrative officers, and the delegation of the powers conferred upon the Minister, and specify the right of the Minister and his officers to enter upon private, public and Crown property to carry out any works deemed necessary to enforce the intent of the Act.

Provisions are made for appeals to the Referee, and for stated cases laid by the Referee before the Appellate Division of the Supreme Court of Ontario. Provisions are made for costs of appeals. Penalties are specified for contravention of the Act. Power to administer oaths and take affidavits is given to the Commissioner.

Notwithstanding the provisions of the Ontario Railway and Municipal Board Act, works for the production, transmission and supply of natural gas shall not be deemed to be public utilities so as to give the Ontario Railway and Municipal Board any jurisdiction respecting the same.

The Natural Gas Act, 1919, is repealed but such repeal shall not affect any regulation or order heretofore made by the Ontario Railway and Municipal Board or by the Minister of Mines, or by the Commissioner under the said Act until the Minister or Referee shall by an order made by him under the authority of this Act, declare such regulation or order no longer in force.

Gold Mining in Ontario

A Plea for Recognition of a Partnership of Interest.

By R. E. HORE.

Gold mining in Ontario has become an important industry since the development of ore deposits at Porcupine and Kirkland lake. It has been demonstrated that our Pre-Cambrian gold deposits stand up well under development. The opening up of the deposits at considerable depth has resulted in many cases in the finding of even better ore than had been looked for. Prior to the development of the deposits discovered in 1909 at Porcupine, there was relatively little evidence that would give confidence that Ontario gold deposits would prove to be workable to great depths. Now there is proof of good ore at the lowest depths yet reached in the mines and more ground for belief that our gold deposits will be found to continue to great depths. This means long lives for the mines now operating and should lead to intensive search throughout Northern Ontario for similar ore deposits. It is reasonable to expect that the result of such search and development will be tremendous expansion in the gold mining industry of the Province. Already many promising discoveries have been made over a wide area and some of these will doubtless result in the swelling of gold production.

THE LAKE SHORE MINE

One of the newer and successful Gold Mines of Northern Ontario.

Gold mining had only commenced on a large scale in Ontario when the war came on and expansion was temporarily halted. The subsequent period of high costs and labor shortage also had a deterrent effect. The return to conditions favorable to the gold mining industry will have marked effects and before the present year is far advanced the industry will be making rapid strides forward. Increased production and more activity in development will soon be under way. It can fairly be assumed that conditions will become so favorable to gold mining that the industry will now become a very big factor in the growth of the Province. That it did so well under very adverse conditions is sufficient proof that it is economically well founded.

Our mineral resources are of little use until they are developed. Those who would develop them must take long chances, for a comparatively small number of ore deposits are found to be workable at a profit. The mines now operating profitably were developed by men who took great risks and were successful. They deserve no little credit for venturing in a field that was a few years ago quite unproven. They had little assurance of success, much less in fact than those who venture now with the results at Porcupine and Kirkland lake before them. Those who are willing to venture will find in Northern Ontario one of the best, if not the best, fields for exploration. The winning of wealth from the rocks is an arduous task and often unsuccessful; but it is an attractive enterprise because of the possibility of making large profits and because those profits come from making productive, an otherwise useless mineral claim. The prospector and the men who furnish the money for the development of gold deposits are performing service useful to the Province and they should receive recognition by every reasonable Government, assistance in exploration and development of new fields.

The benefits which the Province derives from the development of ore deposits are many. The chief essential in any mining enterprise is that it be conducted at a profit and the whole aim of those who engage in gold mining is to produce gold profitably. They do not spend their money and labor with the object of benefitting the community and they make no claim for assistance on such grounds. But it is well known that

the activities of mine operators bring benefits to the community and because of that fact the common interests of the operators and the community demand that the industry be encouraged. The community shares the benefits without running the risk of losses that those who develop the deposits do, and being in a sense a preferred shareholder the community in its own interest should endeavor to see that the industry prospers. If the Ontario Government takes this view and becomes actively interested in speeding up mineral development there should result very rapid growth in the gold mining industry of the Province. It may seem to some that those who ask the Government to assist in developing Northern Ontario are asking for favors that will be merely for the benefit of prospectors and mine operators; but this is not the fact. The men who develop the North ask for assistance as one group of partners in an enterprise desirous of having the other and larger group of partners in the enterprise take a more active part in the work. Their claim is that the results will be mutually profitable and they justify their claim by pointing to the advantages that the Province has already derived from the development of mining lands. From such lands no one derived any benefits until they were developed. This generation will derive benefit from Ontario mineral resources only insofar as those resources are developed in the immediate future. Now is the time to push development of Ontario's gold deposits and those who appreciate the great possibilities ahead are desirous that everything reasonably possible be done to encourage such development. To be satisfied with the progress that is being made is unwise. It is progress worthy of praise; but it is not the progress that should satisfy; it is not the progress that the Government should regard as good enough. There is evidence that the operators will soon be reporting much better progress and that this will be the best year by far for the Ontario gold-mining industry; but there is evidence also that the Ontario Government is not yet awake to the advantages that a policy of active participation in development of mineral resources would bring. To regard the mining industry simply as a source of money for the Provincial Treasurer is a narrow view. The mining industry brings benefits to the Province that far exceed in value any reasonable direct tax on the profits of such mining enterprises as prove profitable.

While disappointed with the Government's attitude in respect to mining profits, there can be little doubt that private enterprise will continue to build up the gold-mining industry in Ontario, and that the increasing importance of the industry will make it apparent that gold production is to be for many years a big factor in the prosperity of the Province. Northern Ontario is rightly regarded as the probable source of many millions in gold and it will be surprising if the Government does not sooner or later assume a more favorable attitude towards mining enterprises.

PORT ARTHUR, ONTARIO.

Mining Notes.

By J. J. O'CONNOR

Clement K. Quinn, of Duluth, Minn. has taken an option to purchase the entire holdings of the Graham-McKellar interests on the Atikokan iron range, adjoining the Atikokan Mine, on which Mr. Quinn secured an option about a month ago.

The Atikokan Mine includes 10E and 11E, on which all the mining operations so far carried on have been done. The properties included in this last option of Mr. Quinn, cover the remaining portion of the Atikokan range, and extend for some miles along the Atikokan River and Sabawe Lake, with the exception of a few isolated holdings.

Mr. Quinn's familiarity with the ores of the Atikokan is known to have induced him to undertake the control of the major portion of the range. He is no stranger to it, having thoroughly examined the mine, and extensions of the formation, by mining and shipping testing lots of the ores, to the furnaces. He is an experienced iron ore operator, being heavily interested in mining and shipping ores from the Minnesota and Michigan ranges.

The price at which the latest option has been taken has not been announced. The option on the Atikokan Mine is for $1,500,000. It is confidently believed that both options will be implemented, and that it is Mr. Quinn's intention to build up an extensive iron ore industry on the Atikokan range.

It has been announced that the product of Mesabi Iron Company, of Babbitt, Minn., will be placed on the market under the trade name of "Mesabi Sinter" about July 1st next, and that Clement K. Quinn & Company, of Duluth, Minn., will be the exclusive sales agents.

The 1921 season analyses guarantees of iron ores issued by Clement K. Quinn & Co. contains the analysis of Mesabi sinter. This analysis shows the sinter to be a high-grade Bessemer product, containing 64 per cent metallic iron, natural; phos. .027, and silica 9 per cent. There is no record of moisture. The sinter is crushed to about three inch size, with fines screened out. The sinter is very porous and is designed to be an ideal furnace product.

The fact that one of the most prominent furnace companies in Pennsylvania, that used the product of the Mesabi Iron Company's testing plant, at Duluth, and found it to be such a satisfactory furnace product, that they have now taken a substantial interest in the enterprise at Babbitt, should be a sufficient guarantee that the sinter is all that is claimed for it, and that it will give a good account of itself in the furnace world.

The coarse crushing unit of the new concentrating plant at Babbitt will be ready for operation May 15th. Production of sinter will begin on or about June 15th, and shipment to the docks at Two Harbours about July 1st.

All doubts regarding this enterprise appear to have been overcome. It has passed through the phase of the most exhaustive tests, and is now looked upon as a permanent industry that will prolong the life of iron ore mining in Minnesota for generations to come.

This undertaking is of paramount interest to Canadians, and should receive their closest attention and investigation, to the end, that our own ores may be subjected to the same treatment.

M. Boretella, of Atlanta, Georgia, has spent over two months in the examination of gold properties in the vicinity of Schreiber. Reports extant, are to the effect that he is well pleased with the result of his investigations. He is now leaving for Chicago to meet his principals, and expects to return in the early spring.

Mr. William Longworth, of Port Arthur, has just completed a road two and a half miles in length, from Schreiber to his claims, where he is doing mining work in the shape of drifting and cross cutting. He reports discovering new leads carrying tellurides and visible gold.

Gas Producer Power Plants

A Successful Installation at Charlottetown, P.E.I.

By H. E. WIDMER, Lacombe, Alb.

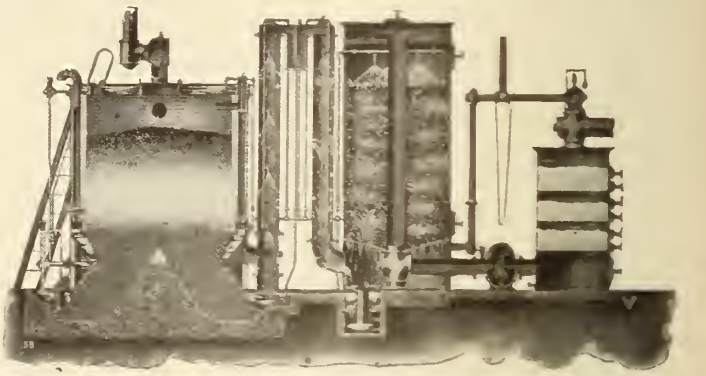
The power question is always one of paramount importance in industry. We are fortunate in having large hydro-electric plants scattered throughout the Dominion, but there are, however, many isolated municipalities and industries so situated that hydro-electric power is not available. In such cases the utilization of available fuels economically becomes a matter of vital importance.

The unprecedentedly high price of coal during the past few years has, of necessity, caused factory and power-plant owners to resort to every possible means of reducing the fuel consumption. These endeavors have usually met with decided success. In considering steam plants however there is a minimum consumption per horsepower per hour below which, practically, it is impossible to drop.

Canada and the States, abounding as they do (in certain localities) in extensive coal-deposits, have not been confronted with the fuel-cost problem as has Europe, until recent years. There the gas producer has solved the problem. As gas-producer power-plants require but 1¼ to 1½ pounds of ordinary bituminous coal or anthracite per brake horsepower per hour, it is readily perceivable why this type of prime mover is used so widely in England and on the Continent. The consequent comparative savings in fuel offer a decided argument in favour of gas-producer plants when determining the type of power installation.

The number of producer-gas power-plants is constantly increasing in the States. Large numbers of plants have been installed also for metallurgical furnace operations, to substitute for the waning supply of natural gas as well as other fuels which have risen abnormally in cost.

A problem which American gas engineers have had to combat is the troubles resulting from the use of bituminous coal. Soft coal contains a high percentage of volatile matter which, if not removed from the gas upon leaving the generator, will condense and clog the mains and interfere with the continuous operation of the engine. Mechanical means technically known as "tar extractors" have been employed many years with varied results. Such apparatus even at best usually is not entirely satisfactory when operating under varying loads and on different grades and types of combustibles. The only positive elimination of the tar



Sectional elevation of type "B" Akerlund gas-producer, adapted to use lignite.

constituents of bituminous fuels is its destruction directly in the generator itself. With the object in view, the Akerlund bituminous producer-system was designed more than a decade ago.

This producer unlike others operates on the down-draft principle; the heavy hydrocarbons upon distillation are forced by the downward suction to enter the incandescent fire-bed where they are decomposed and converted into fixed non-condensible gases. A common difficulty is thus easily overcome.

One of the interesting installations which Akerlund & Semmes, Inc., of New York, have made is a 500 H.P. producer-gas power-plant for the Maritime Electric Company, Charlottetown, P.E.I. The producer is oper-

Operating platform of two 100 h.p. type "A" Akerlund Gas-Producers in use for several years at the plant of the Simonds Saw Company Montreal.

ating on Nova Scotia bituminous coal, and was installed in 1917. The plant furnishes current to the municipality and inhabitants for light and power. The fact that it has given the utmost satisfaction in reliability and economy during this interval is evidence of its practicability.

The following are typical results obtained from the Maritime Electric Co.'s operation log:

24-Hour Test Covering Minimum & Maximum Loads.

Watch	K.W.	Lbs Coal	K.W. per hr.	H.P. per hr.	Lbs Coal per K.W.	Coal per H.P.	Coal per hr.
8-4	1000	2600	12.5	167.5	2.6	1.9	325
4-12	1220	3144	152.2	204.3	2.5	1.8	393
12-8	410	564	31.2	68.6	1.3	0.97	70.5
24 hrs	2550	6308	106.2	142.3	2.5	1.8	262.3
Average of seven tests, consisting of six series of eight hours each, and one of seven hours. Fifty-five hours:	3490	3978	63.4	84.9	1.1	0.85	72.3

Note: Tests made after adjustments to plant, following the first-noted 24-hour test. Ashes removed during 24-hour test were about 800 pounds.

Coal used: Lingan Seam, Dominion Coal Company, with following analysis:

Fixed carbon	55.5
Volatile	38.6
Ash	5.9
Sulphur	2.4
B.t.u's	14,000

The above tests were taken in the Spring of 1920, since which date the plant has been operated at a forty percent overload. At times it has been necessary to operate at only fifteen percent of rated capacity, under which conditions it has been found possible to maintain a fuel consumption of two pounds of coal per horsepower per hour.

The application of producer gas in furnace operations is extensive, possessing numerous advantages. The Simonds Canada Saw Company, Montreal, have operated two Akerlund anthracite producers about seven years, and have recently installed a third unit. The gas is used in the heat-treating of their products. The comparative economies occasioned by use of producer-gas in furnaces are always very attractive and often they are sufficient to return the plant investment within a year.

There are large deposits of lignite in Canada and the States. Often it is of such a grade that its performance under steam boilers is unsatisfactory. In the downdraft producer the various grades of lignite behave nicely—even Brazilian lignite containing 29% ash has given surprisingly satisfactory results. As in the case of ordinary bituminous coal, the consumption of lignite per power-unit is very low; it is almost in direct proportion to the b.t.u. value per pound of the lignite compared with 13,500 b.t.u. bituminous coal.

Summarised, the advantages of a downdraft gas producer are tar-free gas from bituminous coal, lignite, saw-dust, etc., economy, reliability, flexibility and simplicity in design and operation.

500 h.p. type 'B' producer-gas plant for municipal electric-lighting and power. Suitable for utilization of lignite.

Oil Prospecting in the Pas District, Man

By REECE H. HAGUE, The Pas, Man.

With the throwing open of The Pasquia Hills Forest Reserve for oil prospecting under the recent amendments to the Dominion Oil Regulations, considerable staking has taken place in this region.

The presence of large bodies of oil shales in The Pasquia Hills, which lie across the Saskatchewan border, some 40 miles from The Pas, has long been known. In the course of his report to the Geological Survey Department on the Basins of the Nelson and Churchill Rivers, William McInnes, of the Geological Department made several references to these shales. His report which was written in 1911 was published two years later as Memoir No. 30.

Mr. McInnes says, in describing the topography of the district: "The overlap of the cretaceous sediments is marked for a hundred miles west of Lake Winnipegosis by the bold escarpment of the Porcupine and Pasquia Hills, and farther west by the equally high but gently sloping Wapawekka Hills. A partial section of Cretacious rocks making up the Pasquia Hills was seen where the rocks are exposed in gullies worn by streams descending the northerly facing slopes. An estimated section along these gullies, compiled mainly from exposures observed in the trench worn by Nabi River, is as follows, in ascending order:

35 feet-40 feet.—Thick bedded, soft grey arenaceous oil-shale or thin bedded sandstone, holding the remains of fishes which seem to be Enchodus shumardi, large bi-valves, Inoceramus labiatus (Schlotheim) and foraminifera.

0 feet 6 inches.—Compact impure limestone with many casts of Astraea congesta, Conrad.

120 feet or more.—Soft, fissile, light grey (almost black when wet) oil-shales, holding the comminuted remains of fishes and many foraminifera.

15 feet.—Clay iron-stone in beds 6 inches to one foot in thickness, divided by thin partings of shale.

10 feet.—Soft fissile, grey shale that seems to be similar to the oil shales below.

"Overlain, to the surface, by 10 feet or more of boulder clay containing many boulders of limestone and a few of Pre-Cambrian gneiss and granite.

"Mr. Whiteaves, who examined the fossils from the section given above, expressed the opinion that they were probably of Niobrara age.

"The fossils enumerated have a wide range in the Cretaceous, but in Northern Manitoba Enchodus shumardi is most abundant in the Niobrara formation, which with the underlying Benton makes up the Colorado series of the upper Cretaceous. The occurrence of great numbers of foraminifera in the shales is also characteristic of the Niobrara beds of Northern Manitoba.

"The thickness of the Niobrara in Manitoba has been computed to be from 130 to 200 feet, comprising calcareous shales which pass downwards into the shale of the Benton.

Exposure on the Mabi River, showing shale A, eight inch strip of bentonite B, and fossilized zone C.

"The base of the section given above lies at a height of 400 feet or more above the bed of the Carrot River, where, at the rapid above the Red Earth Indian reserve, ledges are exposed that are thought to represent the Dakota division of the upper Cretaceous. They consist of 5 feet of very soft quartzose sandstone deeply stained with iron oxide, lying in undisturbed heavy beds that show false-bedding, and hold nodules and irregular masses of iron pyrites. In places the sandstone becomes a fine conglomerate in certain layers with pebbles of gneiss and other rocks, and in places it contains carbonaceous material resembling the comminuted remains of plants. The soft sandstone is overlain by hard, white quartz sandstone with distinctly red-purple tinge, which is strongly ripple-marked on some surfaces.

"Fifty miles further up the Carrot river from the rapid at which the sandstones are exposed and at an elevation of about 400 feet above that point, grey oil shales quite similar to those of the Pasquia Hills section form the low scarped banks of the river.

"There is thus an interval of 400 feet or more between the observed beds of Dakota sandstone and those of Niobrara shale. A great part of this interval, which on the side of the Pasquia Hills and in the valley of the Carrot river is covered by deposits of boulder clay and by later stratified sands and clays, is without doubt occupied by the shales of the Benton. Shales which, from their relative elevation, would fall into this gap, and which he considered to be of Benton age, were observed by Mr. J. B. Tyrell in the bed of the Saskatchewan below Birch islands."

The Carrot river, which joins the Saskatchewan 2 miles above The Pas flows past the Red Earth Indian reserve. From the crossing of the second base line westerly, the steeply sloping front of the Pasquia Hills rises from the flat land to the south of the river all along. The hills rise to a height of about 1,600 feet above the valley or 2,500 feet above the sea. The hills are made up for the most part of cretaceous sediments, though the base is probably formed of Palaeozoic beds and the summit is covered by varying thickness of boulder clay.

In describing his trip through the Pasquia Hills Mr. McInnes says: "The only exposures of rock in place met in the mountain, were found in the gulches eroded by streams flowing down the hill-slopes. They consist for the most part of soft, grey, fissile shales that contain a considerable amount of bituminous matter, enough to cause them to burn freely, with the emission of a strong odour of petroleum when heated in the camp fire. The best exposures were found in the valley of the Nabi river, where 140 feet or more of thick-bedded sandstone, holding the remains of fishes, bivalves, and foraminifera, are exposed in cliffs along the river; the species are characteristic of the Niobrara division of the Cretaceous."

Under the head Economic Geology Mr. McInnes says that in the newer rocks the oil shales of the Pasquia Hills are of some promise and the discovery of the occurrence of coal, north of Prince Albert, may be followed by the finding of seams of commercial importance.

Altogether more than 40 square miles of territory in the Pasquia Hills have been staked since December last when the new oil regulations came into force. Syndicates have been formed and it is understood that several drills will be on the spot at an early date.

A miniature boom, is in fact, being staged, and local hopes of a future producing oil field are high. Expeditions have been sent out by business men from The Pas, while interests in cities in western Canada have put up money for exploration work.

Many samples of shale have been brought into The Pas, which when lighted will burn freely. Samples of paraffin wax and fossilized remains of fish are also on view.

The expected break-up has interfered with traffic between The Pas and the Pasquia Hills for a time, and it is unlikely that any further parties will venture out until open water, when it is anticipated there will be a big rush to take up sections.

The Pasquia Hills are reached in the winter time by horse team and dog sleigh, and in the summer there is a water route running into the foothills, from whence the best method of travelling will, be by pack horses.

Stuking extends from The Pasquia Hills through to Mafeking, 70 miles from Dauphin, where boring for oil has been in progress for some months.

NOTES FROM NOVA SCOTIA COLLIERIES.

Dominion Coal Outputs.

Production of the Dominion Coal Company for the first quarter of 1921 has been as follows, March being estimated. (Long tons):

	Cape Breton.	Springhill.	Total.
Jan.	256,748	39,645	296,393
Feb.	227,030	43,123	270,153
March	206,000	36,000	242,000 (est.)
	689,748	118,768	809,546
1st quarter, 1920	816,050	119,397	935,447

The production for April will probably not exceed 175,000 tons from the Cape Breton mines, unless trade conditions will permit of larger operations than are at this time possible. The Springhill Collieries will probably not be so seriously affected, as the local demand and railway requirements provide an outlet.

Nova Scotia Steel & Coal Company's Output.

The Sydney Mines Collieries produced in March, 41,306 tons, comparing with 46,801 tons in February, production being fairly well maintained considering the poor demand for coal. Production for the first quarter of 1921 totalled 146,625 tons, comparing with 151,318 tons for the corresponding quarter of 1920. Operations during April are likely to be interrupted by poor demand.

WALL BOARD FROM INFUSORIAL EARTH.

Mr. Ivan A. Bayley, of North Sydney, Nova Scotia, writes as follows: "After experimenting for some time on the utilization of tripolite or infusorial earth, I have succeeded in producing samples of a remarkably efficient wall board. The tripolite, besides containing the necessary bonding material, is mixed with considerable quantities of sawdust which has the effect of adding pliability to the sheets and rendering them more open so that nails may be driven quite near the edge without danger of splitting or spoiling the sheets and makes sawing easy. These sheets are remarkably light in weight and are fire proof, and owing to the well known properties of tripolite, are great non-conductors of heat, cold or sound, and are very strong. These sheets can be made into any convenient size, and owing to the great strength of the binder used may be made as thin as one-quarter of an inch in thickness. As very large beds of tripolite and infusorial earth occur in Nova Scotia, Newfoundland and elsewhere in shallow lake bottoms and marshes, it thus becomes only necessary to drain off these areas and expose the beds to the natural summer drying when the tripolite can be piled in sheds and used as wanted. As both tripolite and sawdust are very cheap materials and the bond used being also very cheap, this process certainly seems to place a very valuable asset at the disposal of home builders. Further experiments are now under way with the object of producing sheets suitable for exterior work and roofing."

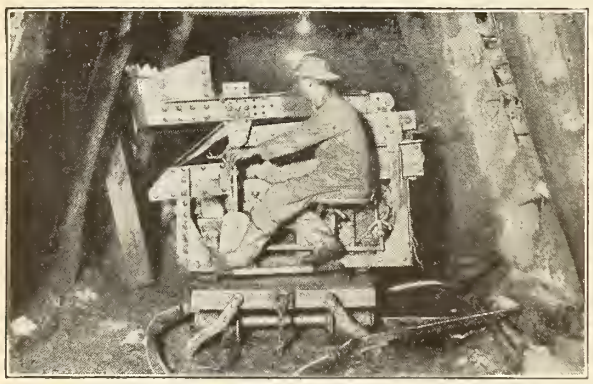
According to official returns of the Government Department of Agriculture and Technical Instruction 1,279,961 tons of coal at an estimated value of £1,271,906, irrespective of a large bulk of coke, were imported into Ireland during the year 1919.

The Hoar Underground Shovel

A Successful Mechanical Loader, Much Used in the Michigan Copper Mines, to be Manufactured in Canada.

The substitution of mechanical devices for loading mined material underground has during the war period made much progress in the United States and in Newfoundland. In the Michigan copper mines a number of devices have been evolved to suit local conditions, a brief account of which was given in our issue of February 6th last, and at the ore mines at Wabana in Newfoundland, the use of mechanical loaders has virtually superseded manual loading. A paper is to be read at the Halifax Meeting of the Mining Society of Nova Scotia in April, by Mr. H. B. Gillis, Superintendent of Mines of the Dominion Steel Company, that will deal with experiences in using mechanical loaders at the Wabana ore mines, where the great height of the ore-seam favors the use of these devices.

One of the loading devices that has found much favour in the Michigan mines is the Hoar Shovel, the invention of a Cornish mine captain long resident in the United States. The Port Arthur Shipbuilding Company is now building one of these shovels for the Canadian Mine Shovel Company, of Toronto, which is introducing the device into Canada. We have received some particulars of the Hoar Shovel that may be of interest to our readers.



The Hore Shovel in position for transport.

The Hoar loader has four principal parts, namely, the truck, the body, the table, and the dipper and dipper sticks. The truck is a substantial steel frame on which are mounted the swinging gear, truck bearings, wheels and rail clamps. The body of the machine is a structural-steel frame to which is rigidly fastened the power unit and which also supports the parallel steel tracks in which the table rollers run. The table is a cast-steel frame mounted on six hardened-steel rollers. It carries the bearings for the double dipper-stick. The dipper mechanism consists of two arms pivoted together so as to allow the dipper a range of flexibility in working the bottom.

The engines used are reversible air-motors, only three levers being used. They are double reciprocating —or in one sense, slide-valve double engines in exceedingly compact form. Two pistons operate, one inside of the other, and transmit a rotary motion to the engine shaft. When the pistons are placed in position in the cylinder, a hole or bearing at the center of the inner piston fits over the pin of the crank on the engine shaft. The outer piston has a lateral reciprocating movement: the inner piston has an up-an-down reciprocating movement. These movements are so arranged and timed that both pistons are always working in unison. The pistons take air through the two circular ports in the cover which have a cored-out connection to the throttle.

All running parts are renewable and all working parts are of wrought-iron, steel or brass. All parts subject to shock, such as table, truck, dipper-arm and rollers are of steel. Truck and body frames and dipper sticks are of structural steel. The wearing parts of the dipper are of special-composition, hard steel.

The shovel swings on double steel-ball bearings. High-grade bronze bearings on the axles add to the ease by which it can be pushed by hand.

All other machine bearings subject to heavy wear are bronze bushed and easily renewable. The hoisting rope is 2 x ¼ inch flat wire-rope tested to a four-ton working load. It is easily removed for replacement.

The Hore Shovel at work.

The Hoar Shovel is primarily designed for underground use. It works nicely in a 7 ft. by 7 ft. drift, but for open pit work, where the large-size steam shovels are not applicable and hand shovelling is necessary, it is excellently adapted, and is a great saving as compared with hand labour. The shovel works with compressed air, using about 300 cubic feet of free air per minute. It can be made to operate with steam, with very little change.

The machine is mounted on a truck, which, in turn, is mounted on eight-inch wheels in front, and twelve-inch wheels at the rear, to give clearance over a high car. The body of the shovel is swung in either direction through a complete circle on double ball-bearings by a reversible air-motor. A second reversible engine, through a self-locking worm gear, drives the table, on which the dipper stick is mounted, forward and backward, giving direct thrust into the breast, as well as the extension needed for dumping and trimming beyond the centre of the dirt car.

As previously stated, the Port Arthur Shipbuilding Company is constructing the Hoar shovel for Canadian sale, and is now working on a first order of six shovels. In Canada, the Canadian Mine Shovel Company of 202 Lumsden Building, Toronto, will handle the rights of manufacture and sale. The shovels are being made in the United States by the National Iron Company of

Duluth, and the patents are owned by the Hoar Shovel Agency, Inc. at Virginia, Minn.

The Hoar shovel is said to be well adapted for work in restricted spaces. Two men, according to the statement of a mining company that is using the shovel, can load sixty tons in a eight-hour shift.

Northern Ontario Letter

THE SILVER MINES.

The Cobalt Field.

In the silver mining districts there is increasing evidence to show that the period of depression has about reached its worst. The quotations for commercial bar silver appear to be "dragging on bottom" as it were, while the cost of producing the metal has definitely commenced to decline. These are two essential factors in the production of any commodity—the value of the product and the cost of producing it. Once let the scales indicate a higher cost than the value, and industry ceases. That is precisely what has already occurred at a number of the important silver mines in Cobalt.

Now, however, with the balance in motion through the price of silver remaining steady while the cost of producing the metal is declining, conditions appear to have past the worst period, and better times appear to lie ahead.

Captains of industry in Northern Ontario take some little satisfaction out of the fact of knowing that the nature of the silver deposits in Cobalt are such as to make it possible to produce silver here just as cheaply, if not actually cheaper than any other part of the world. As a consequence, with everyone knowing that the world must require silver, and the silver mining industry must become stabilized in some way, the miners in the Northern Ontario field are confident of the early return to conditions which will signalize a general rejuvenation of interest and with a greatly increased scope of operations.

Favorable results have been obtained on the University mine of the La Rose Consolidated. A vein opened up late last fall has been yielding substantial quantities of high-grade ore. Close to 25 tons have already been shipped to the sampling plant, the average grade being 3,200 ounces of silver to the ton. In addition to this, a further substantial amount is in sight. The La Rose is also handling a large tonnage of mill rock, and the production for the current year offers promise of netting the company quite large profits.

Advice has been received by the Journal correspondent from South Lorrain that the Keeley Silver Mines will be reopened. Toward this end, pumping operations have already commenced. Just as soon as it becomes possible to enter the lower workings, it is planned to employ three machines on development work, and breaking ore. Last summer and fall the company installed a 20-stamp mill, but a shortage of hydro-electric energy in the fall prevented the utilization of the equipment. Although the power situation has improved somewhat due to curtailment at some of the Cobalt mines, yet the Keeley has remained idle throughout the winter on account of the season being quite unsuitable for resuming work. May 1st, however, is expected to find the mine under operation. As regards ore on the Keeley, it has been officially stated to the Journal that a large tonnage has been placed in sight, which contains values ranging from 40 to 90 ounces to the ton, and contained in a deposit averaging about three feet in width. This strong deposit and the high milling values are expected to enable the company to mine profitably in spite of the poor market for the metal.

Under the management of G. C. Bateman, it is officially stated, the work on the Bailey Silver Mines is being speeded up. Stopes have been cut in the vein at the 5th level where a large tonnage of ore has been placed in sight which averages around 20 ounces of silver to the ton. Meanwhile, a cross-cut is being driven for the purpose of locating the downward continuation of what is called the Big Pete vein. This work is well advanced.

Total silver production from Cobalt during March is estimated at approximately 500,000 ounces. The companies contributing to the output were, in the order of their importance: Nipissing, O'Brien, Coniagas, La Rose and Bailey.

The Crown Reserve is doing a limited amount of work on claims in the Gillies Limit. Some little encouragement has been met with in this work, but not sufficient to encourage more than quite limited operations.

In regard to the wage question in the Cobalt district, the Board of Conciliation had not yet brought in their report at the time of writing. It is understood the companies have decided to proceed with the wage reduction of 15 p.c. as of April 1st, either that or close down. The workers, however, at their latest meeting expressed the opinion that although dissatisfied with the reduction and unwilling to vote to accept the cut, they nevertheless expect the decrease to go into effect and are thus prepared to accept the inevitable. This was the gist of opinion expressed by each speaker. There is no threat whatever of a strike.

The first regular meeting of the Temiskaming Prospectors' Association was held in Haileybury, at which the following officers and council were elected:

President, J. Hill; Vice-President, M. B. Grover; Secretary, T. M. Strain; Treasurer, A. G. Kirkpatrick; Council: N. J. McAuley, Tom Montgomery, Harry Owen, and Lorne Howey, Haileybury; Wm. Smith and Dan Karney, of Cobalt and Peter Graham and M. McLeod, of New Liskeard. While this council represents only three towns in the district, it is understood other towns may be included accordingly as representation is required. Entrance fee is $2 and annual dues $3. The objects of the association are to promote and guard the interests of prospectors and the mining industry. The regular meetings are to be held in Haileybury at 8 p.m. on the last Saturday of each month.

Official announcement is made to the Journal that the Kerr Lake Mining Company has made arrangements to take over the Hargraves property. An option was secured earlier in the year, and had some little time to run, but the holders of the option have decided to take advantage of a clause which provides a discount for cash, and the deal is being wound up at once. In the meantime, the Kerr Lake is conducting exploration work on the Hargraves, having extended the underground workers across the boundary.

Disapproval of the proposed amendments to the Mining Act of Ontario was recorded by a number of leading prospectors at a meeting in Haileybury, particularly in relation to the working conditions. No fear is entertained that of allowing [illegible] people within which to perform the first assessment of

ment work will not operate to the best interests of prospectors and the mining industry.

The Journal has discussed this question on previous occasions, and has suggested a reconsideration of the bill now before the House, with a view to altering the wording so as to require the first instalment of work to be performed within the first three months following staking. With regard to this new bill, the Minister of Mines proposes to reduce the total assessment work to 200 days, of which 40 days shall be required to be performed each year for a period of five years. In spreading the total over a longer term of years than formerly, the amendment seems to be destined to benefit the prospectors, but in allowing a full year within which to perform the first instalment, a serious menace is created in that it would tend to minimize early activity in the newer fields. It would seem to be advisable to require half the first instalment to be performed within the first three months following staking, and the balance of the first instalment to be done within the following three months. This would prevent outside interests from staking out large blocks of territory in close proximity to new discoveries and holding them as a speculation for a full year without doing any work, and in the hope of making a sale before the first year passes.

THE GOLD MINES.

The Porcupine District.

Rain has been falling in all parts of Temiskaming, and the water is rising in the lakes and rivers. Warm winds from the south, and these occasional showers have caused the snow to sag and small streams are taking form, all combining to raise the water in the rivers, and by April 15th complete relief is expected in the power situation.

McIntyre-Porcupine has declared a dividend of 5 p. c., payable May 2nd to stockholders of record April 7th. This is the second disbursement to be made so far this year, and is taken as an indication that dividend payments are to occur with increasing frequency from this date forward. The May disbursement will amount to $180,514.15 and makes a total of $361,028.30 paid so far this year, and an aggregate of $2,355,683.50 since going on a dividend-paying basis. A discovery of importance is reported to have been made on the McIntyre, this time at the south side of Pearl Lake, under the mill.

A meeting of the stockholders of the Porcupine-Keora, being held this week, is for the purpose of considering and if approved, selling two of its mining claims to a company which is as yet unnamed.

The newly organized Allied Porcupine Gold Mines, with an authorized capitalization of 5,000,000 shares of the par value of $1 each, has been incorporated for the purpose of taking over the La Palm and the Three Nations properties, located in the north-eastern part of the township of Whitney. These properties were worked in the early days of Porcupine, and considerable encouragement was met with. Financial difficulties militated against a continuation of the work, and the properties have remained in idleness since that date. It is now proposed to commence work at as early a date as possible. Peter Kirkgaarde, of Toronto, has been appointed consulting engineer for the new company.

Both the Hollinger Consolidated and the McIntyre-Porcupine are making preparations to do considerable construction work this summer. Both companies, and especially the Hollinger, expect to take on greatly increased working forces, and will be obliged to provide the necessary housing accommodation. The Hollinger will build about 130 houses while the McIntyre expects to erect upwards of 25.

Shareholders of the Porcupine V. N. T. are awaiting with more than usual interest the holding of the annual meeting of that company in Toronto April 12th. At that time, information is expected to be forthcoming with respect to the probable course to be followed in connection with re-opening the mine.

Kirkland Lake District.

Production from the Lake Shore mine during February, according to the regular monthly report of the manager, R. C. Coffey, shows a considerable decline. The output for the period amounted to $24,068, the decline being due to the mill operating only 83 p. c. of the possible running time, as well as the ore averaging only $16.44 per ton, as compared with a former average of approximately $25 a ton.

Underground development on the Wright-Hargraves is being pushed forward as rapidly as possible, and general preparations are being made to have the entire plant in operation by May 1st.

It is reported in unofficial circles that one of the larger operating companies in the Kirkland lake district has evinced a desire to secure control of the Hunton-Kirkland Gold Mines. Negotiations have not yet reached a point where the details may be announced, and as yet there does not appear to be more than preliminary discussion of the question.

The Granby-Kirkland is considering the advisability of shifting its attention to the development of two claims in the central part of the township of Lebel, instead of on the property formerly worked in the north-western part of that township.

Larder Lake.

Underground operations have been resumed on the property of the Argonaut Gold, and the shaft is being continued to a depth of 500 feet from the present point of 380 feet deep.

Building Trunk Road.

The Northern Development Branch of the Ontario Government is calling for tenders for the work of clearing a right of way from Krugersdorf to Swastika. This work is for the purpose of connecting the Kirkland Lake, Boston Creek and Larder Lake districts with the Cobalt-Haileybury-New Liskeard districts by road, by way of Englehart and Earlton.

British Columbia Letter

The Collieries.

Coal production in British Columbia stands at about the same level for February, according to official figures, as that shown by the statistics for January. There has been a drop of about 12,429 tons, the output for January being approximately 216,575 as against 204,146 tons for February.

An analysis of the returns indicates that the falling off is attributable to the lesser production of the Canadian Western Fuel Co., Nanaimo, and the Canadian Collieries (D) Ltd., at Comox, and Extension. Due no doubt to the cessation of operations at Herewood, and to some extent to the comparatively little work in pro-

gress at Wakesiah, the Canadian Western Fuel Co's. production has dropped some 11,107 tons. The Canadian Collieries total for February is under that for January some 5,525 tons which is accounted for, as stated, by smaller production at Comox and Extension, the mine at South Wellington having aetually shown a little improvement.

The Granby Company's Collieries at Cassidy, Vancouver Island, is the only large coast producer with an increase. In January there were 19,532 tons produced at Cassidy and in February this went up to 21,681 tons, an increase of 2,149 tons. The Nanoose-Wellington Collieries are down a trifle.

In the Crow's Nest Field the situation has improved slightly, the output for January being 57,582 tons and that for February, 60,454 tons, an increase of 2,872 tons.

Market conditions from the viewpoint of the coast collieries changed little from what they were at the beginning of the year. Aside from domestic and bunker trade there is little foreign business. The Washington State market has fallen off, chiefly through the recent reduction in freight rates which permits Utah coal, which at least is as of good quality as that of Vancouver Island, to be distributed to American Pacific Coast consumers practically as cheaply as that coming from British Columbia.

The Crow's Nest Pass Company, and other eastern British Columbia collieries, are looking forward to better times. With reference to the former concern it is believed that its product is assured of a greater part of the trade of the prairie provinces than heretofore and, if the smelter demands for both coal and coke increase, which depends on the improvement of mining conditions, this company and others may be expected to enjoy a satisfactory year.

Following are the details of the output of British Columbia collieries for the month of February:

COAL OUTPUT FOR FEBRUARY, 1921.

Vancouver Island District.

Mine.	Tons.
Canadian Western Fuel Co.	46,121
Canadian Collieries (D), Ltd.—	
Comox	34,847
South Wellington	6,827
Extension	13,946
Pacific Coast Coal Mines, South Wellington	Nil
Nanoose Wellington Co., Nanoose Bay	4,954
Granby Consolidated MS & P Co., Cassidy	21,681
Old Wellington Colliery (King & Foster)	135
Telkwa Collieries, Telkwa	Nil
Total	128,511

Crow's Nest Pass District.

Crow's Nest Pass Coal Co.—	
Coal Creek	31,120
Michel	22,824
Corbin Coal & Coke Co.—	
Corbin	6,510
Total	60,454

Nicola-Princeton District.

Middlesboro Collieries, Middlesboro	6,728
Fleming Coal Co., Merritt	3,239
Coalmont Collieries, Coalmont	4,420
Prince Coal and Land Co., Princeton	794
Total	15,181

Prohibition of Naked Lights in Coal Mines.

Coal mining conditions in the Province of British Columbia were under discussion in the Provincial Legislature recently as a result of an amendment to the Coal Mines Regulation Act introduced by the Hon. Wm. Sloan, Minister of Mines, and providing for a further application of the principle of "safety first" in connection with underground operations.

In moving the second reading of the amendment Mr. Sloan stated that it would make compulsory the use of the safety lamp, of a pattern approved by the Minister of Mines, in all underground workings in the coal fields of the Province. The effect would be to do away entirely with naked lights.

This action, he said, had been contemplated for a number of years and had been definitely determined by the accident of 1917 on Vancouver Island when four men were snuffed out in a mine that had been considered free from explosive gas. These fatalities, and the circumstances attending them, had served to emphasize that a mine may be safe today and tomorrow develop dangerous gaseous conditions.

During the war it had been difficult to obtain deliveries of mine equipment, etc. Owing to this uncertainty legislation was postponed, the various operating companies being notified that it was the desire of the Department of Mines that the safety lamp should be used in coal mine workings. The result was that 98 per cent of the coal produced in British Columbia was mined under safety lamp conditions.

In the year 1815, Mr. Sloan continued, Sir Humphry Davy, an eminent British scientist, designed the safety flame lamp the principles of which are found in all the safety flame lamps of today. The Davy Lamp was a boon to the coal miners of that time and was considered all that could be desired until mining development required the velocity of the air currents underground to be increased. Then it become evident that this lamp was not safe in an explosive atmosphere with a current travelling at the rate of six feet a second. There had been many improvements made and the present Wolf Lamp, of the new types, was that chiefly used at the present time. This was a double-hooded gauze pattern and a recognized safety flame lamp. These were safe, however, only when not misused. There had been a number of cases of accidents due to the careless handling of the Wolf Lamp. It was to be remembered that it was liable to breakage, particularly under conditions at the "face" and in mine haulage.

The underground workers, it was stated, while of necessity using the safety lamp would prefer the naked light where conditions allow it, principally because of its convenience, it being worn in the cap.

There were two noteworthy stages in the development of illuminants used in coal mining. The first was that already referred to—the invention of Sir Humphrey Davy in 1815—and the second in 1915 in the perfection 100 years later of the Edison Safety Mine Lamp. This lamp had been approved after exhaustive tests by the United States Bureau of Mines. It had won favor with the miners because it had been proved absolutely safe in explosive atmosphere and because the same could be said of it as regards fire hazards. It had a large area of illumination and was convenient. The lamp was worn in the pit cap in the same way as the naked light. It gave a constant and a steady light and produced less eye strain than any other form.

In further pointing the need of the amendment proposed Mr. Sloan said that of twenty-[illegible] coal mine dust

ters in the United States, disasters where fatalities aggregated 100 or more, the naked light had been in use. This light now had been replaced by the Edison electric lamp with the results that there had been a marked decline in the number of accidents resulting from gas explosion.

During 45 years of coal mining in British Columbia, there had been 618 lives lost through underground explosions, 90 per cent being in mines using naked lights.

During 25 years of coal mining in British Columbia 257 miners had suffered more or less serious burns and injuries through gas explosions in the mines.

The amendment, which would have the effect of removing the naked light, marked the beginning of a new era in the history of coal mining in the Province in-so-far as the application of legislation to safety conditions was concerned. British Columbia would be the first coal-mining country in the world to pronounce against the naked light by statute. It was a policy, he was confident, which would be adopted, sooner or later, by all governments charged with the responsibility of protecting the lives of the underground workers in the coal mining industry.

SUDBURY NOTES.

D. E. CUSHING.

Sudbury Syndicate Formed.

Gold has been found on all sides of Sudbury, at Shining Tree, Long Lake, Howry Creek and Goudreau, and now an effort is to be made by Sudbury business men to try and bring the gold camps closer to home. With this in view 100 business men have put up $100 each and are banded together under the temporary name of the Hudson Bay Mining and Development Co. The sole object of the company is to thoroughly explore the district immediately surrounding Sudbury with the hope of striking a gold property.

Tom Saville, an old prospector and the finder of the White Rock of Shining Tree, is to be the field man of the company and this interesting pioneer work will be undertaken immediately. Plans are to take to the field as soon as the snow is off the ground. A large contact runs through this district and mining men are of the opinion that gold in paying quantities should be found.

Goudreau Gold Claims Active.

When Major J. H. Rattray of Cobalt purchased the McCarthy-Webb claims at Goudreau, he awakened a keen interest in this mining camp with the result that since that two other deals have been concluded in that camp.

The latest was the purchase for $50,000 of the Cabin claim, which was acquired by J. A. Johnson of the Canadian Mining and Leasing Corporation from The Algoma Exploration and Development Corporation. This property is half a mile from the McCarthy-Webb claim and adjourns the Morrison No. 1 claim which has been purchased by the Lake Superior Corpn.

Considerable surface work has been done on the Cabin claim but no sinking. Mr. Johnson will send an engineer in immediately to lay out a plan of development of the property.

The Canadian Mining and Leasing Corpn. is the owner of property at Rice Lake Manitoba and expects to have a stamp mill going on its property there, in a couple of weeks.

Shining Tree Properties Being Developed.

The indications are that the Shining Tree gold camp, along with those of Kirkland Lake and Porcupine, is facing a great march forward during the Summer. Large quantities of machinery are being rushed into the camp and though the sleighing is about gone, teams are still going hard to get in all the supplies that have been unloaded at Westree.

Mining men just out from Shining Tree for Easter state that small gangs are at work on all the properties, setting up machinery and unloading supplies.

The Wasapika is at present centring activities on the setting up of two 100 h.p. boilers, so as to have them ready for active operations in the spring. A stamp mill has also been taken into the property during the Winter and is yet to be erected. Manager George Rogers claims that he will have the first mill in the camp going.

Manager Stevens of The Herrick, an old Porcupine pioneer, is installing another boiler and has a program of development laid out that will entail sinking to the 500 ft. level. The camps on this property are excellent and the treasury is reported to be strong.

The White Rock is controlled by Sudbury men. Another boiler is being installed and the company is looking around for a stamp mill. A strong fissure-vein runs across this property for half a mile and assays show rich ore in places.

A rich new find is reported on the claims of Messrs. Burke and Langtier, in Churchill Township. Considerable coarse, free gold is to be seen over several feet of this vein, which has been opened up for 500 feet and is standing up well.

TORONTO NOTES.

At a meeting of bond and debenture holders of the British America Nickel Corporation held in Toronto last week, the opposed scheme of reorganization was endorsed.

Opposition developed at the meeting of the holders of first mortgage bonds during the morning. However, out of $5,972,000 bonds which were represented, holders of $5,347,000 voted in favor of the resolutions having to do with the plans for reconstruction. Representatives of M. J. O'Brien, Ltd., voted against the resolution in respect of $625,000 of bonds. The Chairman at this meeting was W. D. Gwynne, and he declared the "extraordinary resolutions" adopting the scheme of the reorganization as carried by the necessary majority. At the meeting of debenture stockholders in the afternoon, $8,552,050 of 6 per cent debenture stock was represented, and the resolutions carried unanimously.

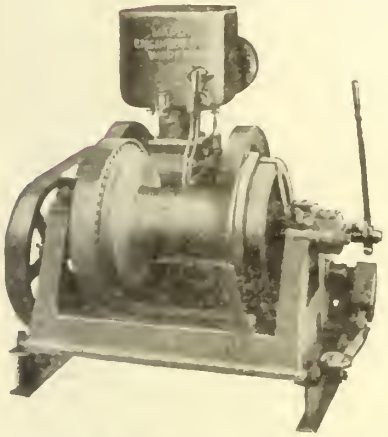
Try to Postpone Meeting.

An effort was made during the morning on the part of M. J. O'Brien, Ltd., at Osgoode Hall to have the holding of the meeting postponed. Mr. Justice Rose granted an exparte injunction until April 7, but one that might be dissolved on 24 hours' notice. Strachan Johnston, K.C., who appeared for M. J. O'Brien, Ltd., expressed fear that the meeting, unless enjoined, would vote on "extraordinary resolutions" which, it was suggested, would wipe out the minority bondholders of the issue of March 15, 1916. The meetings, however, were held with the above-mentioned results.

GASOLINE HOISTS

IDEAL FOR PROSPECTORS

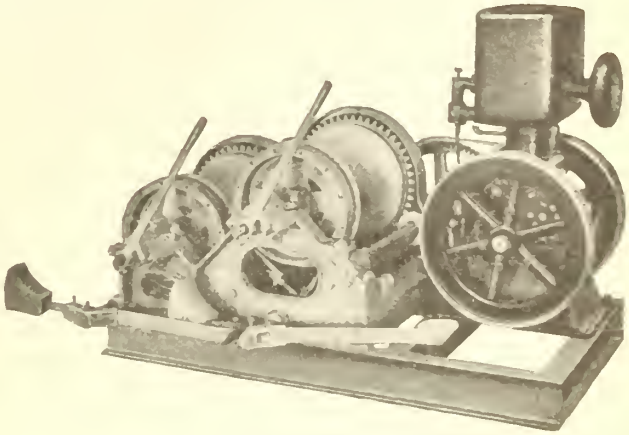
For Developing Claims, and for Operating Small Mines, Quarries, etc.



Single Drum Hoist
For Pit Work and General Purpose Work
Made in Two Sizes, 6 H.P. and 10 H.P.

What One Customer Says.

"—You can fully believe that no money could purchase our machine from us if we were unable to replace it." —(Name on appication.)



Double Drum Hoist
For Derrick Work
Made in Two Sizes, 6 H.P. and 10 H.P.

GASOLINE HOIST SPECIFICATIONS
For both Single and Double Drum Machines

Horse Power of Gasoline Engine Regularly Supplied	Diameter of Drum or Drums	Length of Drum or Drums	Depth of Drum Flange	Weight Lifted or Pulled on a Single Line	Hoisting or Pulling Speed per Minute	Estimated Shipping Weight with Engine		Code Words of Hoist Complete with Engine	
						Single Drum Hoist	Double Drum Hoist	Single Drum Hoist	Double Drum Hoist
TYPE A 6 H.P.	9"	15"	4½"	1650 lbs.	120 feet	1800 lbs.	2400 lbs.	Gabardine	Gallic
	12"		5"	1240 lbs.	160 feet	1850 lbs.	2500 lbs.	Galaxy	Galleon
	14"		4"	1065 lbs.	186 feet	1900 lbs.	2600 lbs.	Gammon	Gamut
	16"		3"	930 lbs.	213 feet	2000 lbs.	2800 lbs.	Gannet	Gandes
TYPE B 10 H.P.	12"	20"	5"	2750 lbs.	120 feet	3300 lbs.	4700 lbs.	Gabion	Gamboge
	14"		4"	2360 lbs.	140 feet	3475 lbs.	4800 lbs.	Ganglion	Gauntlet
	16"		5"	2060 lbs.	160 feet	3575 lbs.	5000 lbs.	Garland	Garnet
	18"		4"	1830 lbs.	180 feet	3700 lbs.	5250 lbs.	Garrote	Gavel
	20"		3"	1650 lbs.	200 feet	3925 lbs.	5500 lbs.	Gazelle	Gastric

Note—All the above specifications are for our standard machines fitted with the standard size of Gasoline Engine, as listed at the left of above schedule.

AN UNSOLICITED TESTIMONIAL

Dear Sirs:-

Regarding the 6 H.P. Single Drum "MARSH" Gasoline Hoist that I purchased from you last August I take pleasure in advising you that this machine met the requirements perfectly and would say that it is giving entire satisfaction in every respect.

I am using this Hoist in my coal mining operations, for the purpose of hoisting the coal about eighty feet. At present I hoist one-half a ton of coal per load and hoist about ten tons every 90 minutes, with one man operating Tipple Head and Machine.

The cost of operating this machine for the work as specified is approximately 50 cents, possibly less.

Yours very truly,
(Name given on request.)

Steel Mine Buckets
Any Size or Design You Want

MARSH ENGINEERING WORKS, LTD.

Established 1846

BELLEVILLE, ONTARIO

Sales Agent: MUSSENS, LIMITED, MONTREAL
TORONTO, WINNIPEG, and VANCOUVER

Overhead Sheaves
With Shaft and Boxes

The new financing arrangements which the bond and debenture holders voted on involve the issue of $24,500,000 in income bonds of three classes: $6,000,000, first income; $6,000,000, "A" income, and $12,500,000, "B" income. Of the first issue, $4,000,000 will be hypothecated for debts to Canadian and Norwegian banks, and the balance held in the treasury. The second $6,000,000 will be exchanged for 15-year first mortgage bonds, and the $12,500,000 issue will be exchanged for $10,000,000 debenture stock, and the remaining $2,478,000 will be issued to satisfy certain claims of Norwegians, who were prominent in the organization of the corporation.

In the Ontario Legislature last week, the House considered Hon. Harry Mills' bill amending the Mining Act, when Hon. Howard Ferguson took the view that a man staking a claim should not be called upon to make an affidavit that he has discovered valuable mineral, but should only be ready to go ahead and do the necessary work. Malcolm Lang, who has had considerable experience as a prospector, said he had always been opposed to the "discovery" clause.

It was announced on Saturday that the option on the Flin Flon copper property in Northern Manitoba had been allowed to elapse. The option had been secured early last year by the Mining Corporation of Canada, associated with Colonel W. B. Thompson, of New York. It was stated in Toronto last week, by interests close to the parties concerned, that the hope of preceeding with the arrangement had not been given up, but that present conditions by way of low price of copper and the financial situation generally had made it unwise to proceed with the deal at the present time. A year ago, it is pointed out, copper was selling at 19 cents, while now it is below 13 cents and several of the copper producing mines have closed down owing to lack of business. Copper prices rose to 36 cents during the war, but ruled around 23 to 25. The metal was in great demand, bringing activity and profits to the larger mining enterprises. Flin Flon is a big property on the border between Manitoba and Saskatchewan. The Commissioner for Northern Manitoba has recommended that the Government of that province build a railway from La Pas to the property at an estimated cost of $2,500,000, the undertaking being contingent on the guarantee of the Flin Flon syndicate, that the purchase of the property would be proceeded with in March, 1921, and that the mine and smelter would be operated on the completion of the railway on a basis of at least 2,000 tons of ore per day. Last October the prediction was made that the ore body would run to about 24,000,000 tons.

The Keora sale deal, under which the two main claims of the company are to be sold to a newly organized concern, to be known as the South Keora Mines, Limited, was approved at a largely attended meeting of shareholders in the King Edward Hotel on April 4th last. The proposals as submitted by the directors went through with only one shareholder voicing opposition, the vote being practically unanimous in favor of the project. Three of the directors of the new company are now members of the Keora board. Keora receives by way of payment 2,000,000 shares out of the 3,000,000 at which the new company is capitalized. The remaining 1,000,000 will be offered to the public at 30 cents a share and the money used for development purposes.

TORONTO MINING STOCK QUOTATIONS.

Quotations on Active Stocks on Standard Stock Exchange for Week Ending April 2nd 1921.

Silver.	High.	Low.	Last.
Adanac Silver Mines, Ltd	1½	1½	1½
Bailey	3	3	3
Beaver Consolidated	36½	35¾	35¾
Coniagas	1.90	1.90	1.90
Crown Reserve	15	15	15
Gifford	1⅛	1	1
Hargraves	1¼	1¼	1¼
La Rose	21	21	21
McKin.-Dar.-Savage	20	20	20
Mining Corp. of Can.	100	98	98
Nipissing	8.75	8.50	8.50
Temiskaming	25	25	25
Trethewey	14½	12	13½
Gold.			
Atlas	18	9	9¾
Boston Creek Mines	15	15	15
Dome Extension	60	60	60
Dome Lake	3¾	3¾	3¾
Dome Mines	18.80	18.00	18.50
Gold Reef	3¾	3⅝	3¾
Hollinger Cons.	7.00	6.89	6.95
Hunton Kirkl'd G.M.	9½	9½	9½
Keora	16	12	14¼
Kirkland Lake	50	49¼	49¼
LaBelle Oro	30½	30	30½
Lake Shore M. Ltd.	1.15	1.14	1.15
McIntyre	1.98	1.95	1.95
Newray Mines, Ltd	6½	6½	6½
Porcupine Crown	21	20½	20¾
Porcupine Tisdale	1.1	1.1	1.1
Porcupine V.N.T.	21	19½	20
Schumacher	25½	23	25½
Skead	52	50	50
Teck-Hughes	11	10	11
Thompson Krist	6	5¾	6
West Dome	7	6¼	6½
West Tree Mines Ltd	6	5	5
Oils			
Ajax Oil	24	24	24
Rockwood Oil, Gas	3¼	3¼	3¼
Vacuum G.	10	9½	9½

TORONTO METAL QUOTATIONS.

	April 5.
Copper, electro	17¼
Copper, casting	17
Tin	34
Lead	6½
Zinc	7½
Aluminum	34
Antimony	7½

MONTREAL METAL QUOTATIONS.

Following are fair average prices for ingot metals (in less than car-load lots) at Montreal:

	Mar. 30	April 6
Copper, Electro	17¼	17
Copper, Casting	17	16¾
Tin	35½	34
Lead	6½	6
Zinc	7½	7
Aluminum	35	34
Antimony	7½	7¼

The Canadian Miners' Buying Directory.

Acetylene Gas:
Canada Carbide Company, Ltd.
Canadian Fairbanks-Morse.
Preet-O-Lite Co. of Canada, Ltd.

A.C. Units:
MacGovern & Co.

Agitators:
The Dorr Co.
Air Compressors:
Sullivan Machinery Co.
Air Hoists:
Canadian Ingersoll-Rand Co., Ltd.
Mussens, Limited.

Alloy and Carbon Tool Steel:
H. A. Drury Co., Ltd.
International High Speed Steel Co., Rockaway, ·
Peacock Brothers Limited.
Alternators:
MacGovern & Co.

Spielman Agencies, Regd.
Aluminium:

Amalgamators:
Northern Canada Supply Co.
Mine and Smelter Supply Co.
Wabi Iron Works.
Antimony:
Canada Metal Co.
Antimonial Lead:
Pennsylvania Smelting Co.
Arrester, Locomotive Spark:
Hendrick Manufacturing Co.
Assayers' and Chemists' Supplies:
Dominion Engineering & Inspe tion Co
Lymans, Limited
Mine & Smelter Supply Co.
Pennsylvania Smelting Co.
Stanley, W. F. & Co., Ltd.
Ash Conveyors:
Canadian Link-Belt Company
Ashes Handling Machinery:
Canadian Mead-Morrison Co., Limited
Canadian Link-Belt Co., Ltd.

Assayers and Chemists:
Milton L. Hersey Co., Ltd.
Campbell & Deyell
Ledoux & Co.
Thos. Heys & Son
C. L. Constant Co.
Asbestos:
Everitt & Co.
Balls:
Canadian Foundries and Forgings, Ltd
Canadian Steel Foundries, Ltd.
Hull Iron & Steel Foundries, Ltd.
Fraser & Chalmers of Canada, Ltd.
Peacock Brothers Limited.
The Electric Steel & Metals Co.
The Wabi Iron Works.
The Hardinge Conical Mill Co.
Ball Mills:
Hardinge Conical Mill Co.
Hull Iron & Steel Foundries, Ltd
Mine and Smelter Supply Co.
Fraser & Chalmers of Canada, Ltd
The Electric Steel & Metals Co
The Wabi Iron Works.
Balances—Henssler:
Canadian Fairbanks-Morse Co., Ltd
Mine and Smelter Supply Co.
Babbit Metals:
Canada Metal Co.
Canadian Fairbanks-Morse Co., Ltd
Hoyt Metal Co.
Ball Mill Feeders:
Fraser & Chalmers of Canada, Ltd
Hardinge Conical Mill Co.
Hull Iron & Steel Foundries, Ltd
Ball Mill Linings:
Hardinge Conical Mill Co
Hull Iron & Steel Foundries, Ltd
Belting—Leather, Rubber and Cotton:
Canadian Fairbanks-Morse Co., Ltd
Canadian Link-Belt Co., Ltd
The Mine & Smelter Supply Co
Northern Canada Supply Co.
Jones & Glasco.
Belting:
R. T. Gilman & Co
Gutta Percha & Rubber, Ltd
Belting—Silent Chain:
Canadian Link-Belt Co., Ltd
Hans Renold of Canada, Limited, Montreal, Que
Jones & Glassco (Regd.)
Belting (Transmission):
Goodyear Tire & Rubber Co
Belting (Elevator):
Goodyear Tire & Rubber Co

Belting (Conveyor):
Goodyear Tire & Rubber Co.
Gutta Percha & Rubber, Ltd.

Blasting Batteries and Supplies:
Canadian Ingersoll-Rand Co., Ltd
Mussens, Ltd.
Northern Canada Supply Co.
Canadian Explosives, Ltd.
Giant Powder Co. of Canada, Ltd.

Bluestone:
The Consolidated Mining & Smelting Co
The Coniagas Reduction Co., Ltd.

Blowers:
Canadian Fairbanks-Morse Co., Ltd
MacGovern & Co., Inc.
Northern Canada Supply Co.
Fraser & Chalmers of Canada, Ltd.

Boilers:
Northern Canada Supply Co.
Canadian Ingersoll-Rand Co., Ltd
Marsh Engineering Works
MacGovern & Co., Inc.
R. T. Gilman & Co.
Fraser & Chalmers of Canada, Ltd.
The John Inglis Company
Wabi Iron Works.

...de Vitriol (Coniagas Red):
Canadian Fairbanks-Morse Co., Ltd.

Bortz and Carbons:
Diamond Drill Carbon Co.

Boxes, Cable Junction:
Standard Underground Cable Co. of Canada, Ltd.
Northern Electric Co., Ltd.

Brazilian Rough Diamonds:
Diamond Drill Carbon Co.

Brazilian Mica:
Diamond Drill Carbon Co.

Buggies, Mine Car (Steel)
Hendrick Manufacturing Co

Brazilian Ballas:
Diamond Drill Carbon Co.

Brazilian Rock Crystal:
Diamond Drill Carbon Co

Brazilian Tourmalines:
Diamond Drill Carbon Co

Brazilian Aquamarines:
Diamond Drill Carbon Co.

Bridges—Man Trolley and Rope Operated—Material Handling:
Canadian Mead-Morrison Co., Limited

Bronze, Manganese, Perforated and Plain:
Hendrick Manufacturing Co.

Buckets:
Canadian Ingersoll-Rand Co., Ltd
Canadian Mead-Morrison Co., Limited
The Electric Steel & Metals Co
R. T. Gilman & Co.
Hendrick Manufacturing Co
Canadian Link-Belt Co., Ltd.
Marsh Engineering Works
Mussens, Ltd.
MacKinnon Steel Co., Ltd
Northern Canada Supply Co.
Fraser & Chalmers of Canada, Ltd
The Wabi Iron Works
Buckets, Elevator:
Canadian Link-Belt Co., Ltd
Hendrick Mfg. Co
Peacock Brothers Limited.

Cable—Aerial and Underground:
Canada Wire & Cable Co
Northern Canada Supply Co
Standard Underground Cable Co of Canada, Ltd

Cableways:
Canadian Mead-Morrison Co., Limited
Fraser & Chalmers of Canada, Ltd
Mussens, Ltd.
The Wabi Iron Works
R. T. Gilman & Co.

Cages:
Canadian Ingersoll-Rand Co., Ltd., Montreal, Que
Northern Canada Supply Co.
Fraser & Chalmers of Canada, Ltd
The Electric Steel & Metals Co
The Mine & Smelter Supply Co.
Mussens, Ltd.
The Wabi Iron Works

TORONTO COAL PRICES.

Toronto, April 6.—The coal market remains quiet with an evident desire on the part of consumers not to make contracts. Very little coal is moving. Bituminous is quoted at $2.75 to $3.25 U. S. funds, mine, for lump and $2 to $2.25 for slack, with smokeless laid down in Toronto for $7.75. The price of anthracite coal in Toronto is $15.50 generally throughout the city.

BRITISH AMERICAN NICKEL CORPORATION.

The plans for reorganization of the British America Nickel Corporation were approved at meetings held in Toronto on Thursday, Mar. 31. $24,500,000 in bonds of three classes will be issued in exchange for outstanding bonds and to satisfy claims of some parties who took part in the organization of the company.

Some objection to the plan of reorganization was aired in Osgoode Hall on the day of the meeting, representatives of M. J. O'Brien Ltd. asking for an injunction to protect that company's bond holding. Apparently however there was little opposition from any other bondholders and the scheme already announced has been approved.

With this reorganization affected the company should be in shape to resume operations again when the market for nickel and copper improves. At present the company is not operating its mine, smelter or refinery. It was reported that development work would shortly be resumed at the Murray mine, but this has been denied and the company has not announced that such work will be undertaken.

Keora.

Shareholders in Porcupine-Keora Gold Mines Ltd. will be asked shortly to consider a proposal to sell two of the company's claims to a new company which the present company would control by stock ownership. The company would retain ownership of three claims and of its present mining plant.

British-American Oil.

The annual meeting of British America Oil Co. Ltd. was held in Toronto on Mar. 31. A quarterly dividend at the rate of 8 per cent per annum is payable April 1.

The company has secured a number of oil leases in the West, including some at Fort Norman. Development of such properties is not at present a big factor in the company's business; but may become so if important fields are developed.

The officers are S. R. Parsons, president, A. L. Ellsworth, vice-president and secretary-treasurer.

The Mining Society of Nova Scotia

29th Annual Meeting.—Halifax, N. S. April 5th, 6th, 1921.

The Mining Society of Nova Scotia is the *doyen* of the mining organizations in Canada. The members guard very jealously its identity as a society, and its autonomy of action, and are proud of the Society's long record of service.

In 1913, owing to the decline of gold mining, and the rise of the coal-mining and steel industries, the preponderance of mining interest in Nova Scotia shifted to the coal and steel centres of the mainland and Cape Breton Island, and the Headquarters of the Society were moved to Sydney, the several coal and steel companies having guaranteed financial support.

The first meeting held in Sydney in the Spring of 1914 was unqualifiedly successful, and was attended by a deputation from the Canadian Mining Institute headed by the late Mr. G. G. S. Lindsay, a gentleman who during his presidency showed vision in regard to the policy of the Institute and energy in forwarding that policy, characteristics which rendered his early demise a great loss to the Institute. As a result of Mr. Lindsay's vision, ably seconded by Mr. H. Mortimer Lamb, the Institute shortly afterwards received by affiliation an accession of something over 120 members, almost exclusively technical men engaged in practising as miners, metallurgists and engineers.

After the successful meeting of 1914 there came the unheralded storm of war, which absorbed the energies of the members of the Society to such an extent that annual gatherings of the traditional type were regarded as inadvisable until the Spring of 1917, when meetings for the reception of papers were resumed.

The Halifax meeting in 1921 was the first gathering of the Society since 1913, and the evident vitality of the organization after eight years of change and stress must have convinced the members of the local government and others in the provincial capital that the translation of headquarters has been justified by the present health and vigor of a technical organization that has always been consulted by the provincial Mines Department when expert advice was needed. In this regard the Mining Society has come to be regarded as a wise counsellor, a condition that represents an ideal that might be aimed at by the Canadian Mining Institute in the larger sphere of federal legislation.

The communications of the Mining Society of Nova Scotia, and the discussions thereon, are more intimate and practical than those of larger gatherings, and the Halifax Meeting once more exemplified that papers are only of value—or rather are of greater value—inasmuch as they afford opportunity and scope for discussion. It matters little whether the subject discussed be local in its application, or not, the principle seems to become clearer *that the discussion is the thing*.

The papers read at Halifax were of more than local concern. They included discussion of such general interest as the preparation of coal for market, the fighting of mine fires, the relative merits of longwall mining, the efficient use of compressed air in mining, the civil re-establishment of the cripples of industry, the working of coal under the sea, the extent to which mechanical devices can be substituted for hand labor in

loading coal and ore underground; the extension of central electric-power-stations to mining, and the wider use of electrical power in mining and mining transportation, with which was correlated the electrification of railways; and industrial welfare work.

Almost any one of the subjects or papers menti-oned would form the basis of a topical discussion, which if held say at the Annual Meeting of the C. I. M. & Metallurgy next year, or at the annual western meeting next Autumn, would, because of publication and perusal prior to the date of these meetings, evoke an intelligent symposium of matured and widely-drawn opinion that is not in any other way to be brought about.

The Council of the C. I. M. & Metallurgy might with possible profit consider whether the proceedings at the annual metropolitan gatherings should not be confined to papers and subjects of national import, and of outstanding merit, and to the presentation for discussion of papers of similar character presented in the first instance at divisional and branch meetings.

The papers read at Halifax deserve a wider publicity and a better fate than can be secured to them by such desultory publication in the Bulletin as space considerations will permit, and final entombment in the Transactions of the Institute, after but one opportunity—and that a limited one—given for discussion and the citation of the additional facts that wide discussion always calls forth.

We submit there must be some better way by which to draw closer the ties of membership in the Institute, to bring out the community of problems and interest of the fraternity, to encourage young writers, and also writers of deserved eminence, to enrich the Transactions, and to ensure that communications to the Institute achieve more effectual publicity, evoke more definite action and bring more *kudos* to the Institute than has yet been found to result from the course marked out by the dead hand of precedent.

Will the Institute please wake up and discover that from now on the motive power of the organization and the source of the best material for a distinctive volume of annual transactions is to be found not in the annual metropolitan gatherings, but in utilising and carefully cultivating the resources of the branches, and of the operating men who compose the branches?

It should be the much-prized privilege of the Council to select for presentation and adequate discussion at the Annual Meeting one or more papers of merit presented to the branches during the year. What an opportunity is here presented to the Council to unify the membership in lines of thought, (which must always precede action) and to make the least-known branch member feel that, if he really has anything to add to the general fund of knowledge, his voice may be heard by all members; and his thinking may result in action by the Institute as a unit.

Proceedings of the Meeting

Meetings were held in the Board of Trade Rooms in Halifax on the 5th and 6th of April. About fifty members were in attendance at the sessions. Arrangements for the meeting were made by a committee of Halifax members, namely: Messrs. Harry Wylde, C. H. Wright and Saunders, and other Halifax members in attendance included C. C. Starr, Professor F. J. Sexton, and Mr. Hiram Donkin, the Deputy Commissioner of Mines for Nova Scotia. The Montreal delegation—which might have been larger—was composed of the Secretary of the C. I. M. & M., Mr. G. C. Mackenzie, Mr. E. Godfrey, Canadian Explosives Company, and the Editor. A very representative gathering of miners and steel men were present from the Sydneys and the Pictou County fields. An approximate list of those present at the meetings will be found elsewhere in this issue.

Opening Session.

With George D. Macdougall in the Chair—in the absence of Mr. A. J. Tonge, the retiring president, who is in England—the proceedings opened on the morning of the 5th. The Secretary reported gross funds to the Society's credit of $1,229.

The election of officers resulted as follows: President, George D. Macdougall; Vice-President, C. M. Odell; 2nd vice-President, Alex. S. McNeil; Secretary-Treasurer, E. C. Hanrahan; all by acclamation. The ballot for members of Council resulted as follows: T. J. Brown, D. H. McDougall, Thomas Cantley, F. W. Gray, Hugh B. Gillis, Walter Herd, F. H. Sexton, H. J. McCann, W. H. Graham, Robert Drummond, Malcolm Blue, F. E. Lucas, J. S. Whyte, R. E. Chambers, F. E. Notebaert, Alexander McEachern.

Name of Society to Remain Unchanged.

The letter ballot regarding the proposed change of name of the Society to include the word "Metallurgical" showed a majority against a change, so that the title of the Society will now remain without alteration.

The President-elect, Mr. George D. Macdougall, of New Glasgow, delivered the presidential address, which follows:

PRESIDENTIAL ADDRESS.

"It is a matter of sincere regret to me," "as I know it is to you, that your President, Mr. A. J. Tonge is not present at this annual meeting, as we certainly would have expected, on account of his long and intimate connection with the mining of coal, an address of much value and interest.

"We may perhaps consider, that on account of the general business depression, that our meeting is held under very unfavorable auspices. As the coal mining and steel manufacturing enterprises, with which the majority of us are associated, are particularly depressed at the moment, we might well be expected to reflect that depression.

Conservation of Fuel and Power.

"We must in all our consideration keep in mind that the coal mining process is daily increasing in difficulty owing to depletion of more easily won land areas and dipping of seams to seaward, making for more distant working areas, greater difficulty in transportation and generally greater costs of production.

"I trust, however, that that is not the spirit in which we find ourselves, but rather we, realizing conditions

Mr. Geo. D. Macdougall, President, Mining Society of Nova Scotia.

as they exist, will dedicate ourselves anew to the problems confronting us, that we shall use our energy, our knowledge and resources of our society to devise ways and means to improve the general situation.

"In this connection, I think that much remains to be done in the conservation of power and of fuel used in the industrial as well as the domestic field.

"It is well known that the coal consumed for general domestic purposes is wastefully burned. To remedy such, in certain sections of the United States, community heating has been established. Central stations supplying hot water pumped over determined areas, have not only simplified the problem for the householder and businessman, but by the greater efficiency have decreased the cost, and saved considerable fuel. The extent to which such application can be made, should we consider this method, will of course be to various sections of the province, determined by conditions pertaining, as while the percentage of efficiency should probably be the same in all localities, the money saving will be greater in sections farthest removed from the pit head.

Gasification of Coal.

"Another possible economy may be effected through gasification of coal. By this it would be intended that coal would be carbonized in retort by-product ovens, the gas being purified of its tar and ammonia, but not of bensols, would be used for cooking, heating and lighting purposes in industrial plants or in domestic furnaces. If considered advisable the tar could be refined, producing hard and soft pitch, light oils, carbolic acid creosote oil and other products, or when carried to ultimate refining would give innumerable dyes, drugs, etc., etc. The ammonium sulphate is a fertilizer, and its sale would reduce operating costs according to sulphate market prices.

"It should also not be overlooked that use of electric power is becoming more common in the home for heating, and projected cheap power from our provincial streams will lessen, more and more as years go by the use of coal for domestic purposes.

"Neither should we overlook the possibilities of recovery of oil fuel from the rich shales of our province. What has been accomplished in the old world, is possible in this. With the revival of trade, will surely come the demand for those oil products which in the past few years have entered so largely into the industrial life of nations, and to meet those demands, every available sources may be taxed again. The oil shale deposits of this province therefore may possibly play an important part in the problem, and they merit more attention than has been given them in the past.

Use Low Grade Products.

"Possibilities of greater economy exist in the coal mining industry itself. Some points worthy of consideration in this connection are the utilization to a greater extent than at present of the waste or lower grade products of the mine in the development of of power, and the economies and increased efficiency to be derived from a more general application of electric power to the mining operations.

"In the industrial field and more particularly in iron & steel manufacture, the greatest possibilities exist, and it must of course not be forgotten, that the question is an economic one requiring large expenditure of capital on which justifiable returns must be assured by saving in fuel consequent upon this outlay.

"Generally speaking in Nova Scotia steel plants to day, coal after being washed of its impurities is carbonized, and resultant coke used as blast furnace fuel, while middlings from washer are available for general fuel purposes. Coal is gasified by process of destructive distillation to give gas fuel required for Open Hearth steel production, and coal is used in a solid or gaseous form for heating purposes at the rolling mills. Coal also is used to a considerable extent in generating steam for power purposes, and for other incidental uses. It is true that at the blast furnace plants, the tunnel head gases are used in boilers to generate steam, and that at the plant of the Dominion Iron & Steel Company, a most modern by product coke oven plant provides for the surplus gas to be used for heating steel at the rolling mills.

The Ideal Situation.

"The ideal situation however which we would have before us is the manufacture of steel to the stage at least that steel is now being manufactured in the province, from the quantity of coal required to furnish the necessary coke for blast furnace, and utmost economies practised in each operation. I realize that such a consideration has not been attained, nor am I prepared to

say that such desired results are in sight, but I really think the chances of reaching a high standard, even if difficult to attain, are better assured of accomplishment if we are not easily satisfied.

The means of accomplishment are essentially of an engineering nature, and include principally,

Carbonization of Coal and recovery of by-product.

Cleaning of Blast Furnace gases.

Use of gas engines for electric and blowing power.

Use of Blast Furnace gases in Boilers for Steam Turbines as may be required.

Use of Coke Oven gas or Blast Furnace gas, either pure or mixed, for Open Hearth Furnaces, Mixers, Heating Furnaces or Boilers.

Motor drives on all rolling mills, as well as general application of electric power for all possible purposes.

Recovery of all heat possible from furnace off-gases.

General use of modern labour saving machinery.

Modern economical design of furnaces, mills, as well as a well proportioned and laid out plant for proper handling of raw materials and product.

"These items while not complete, indicate the magnitude of the problem, but this should not be a deterrent to our giving it the generous consideration it deserves. There are undoubtedly other features of our industrial activities, which might be similarly considered all with eventual conservation of our fuel as an objective. You will pardon me, I trust, for speaking so particularly, but one is quite apt to speak along lines with which one is most familiar, hence the subject chosen. With you I have every confidence in the mining and metallurgical future, as well as the future of our Province as a whole.

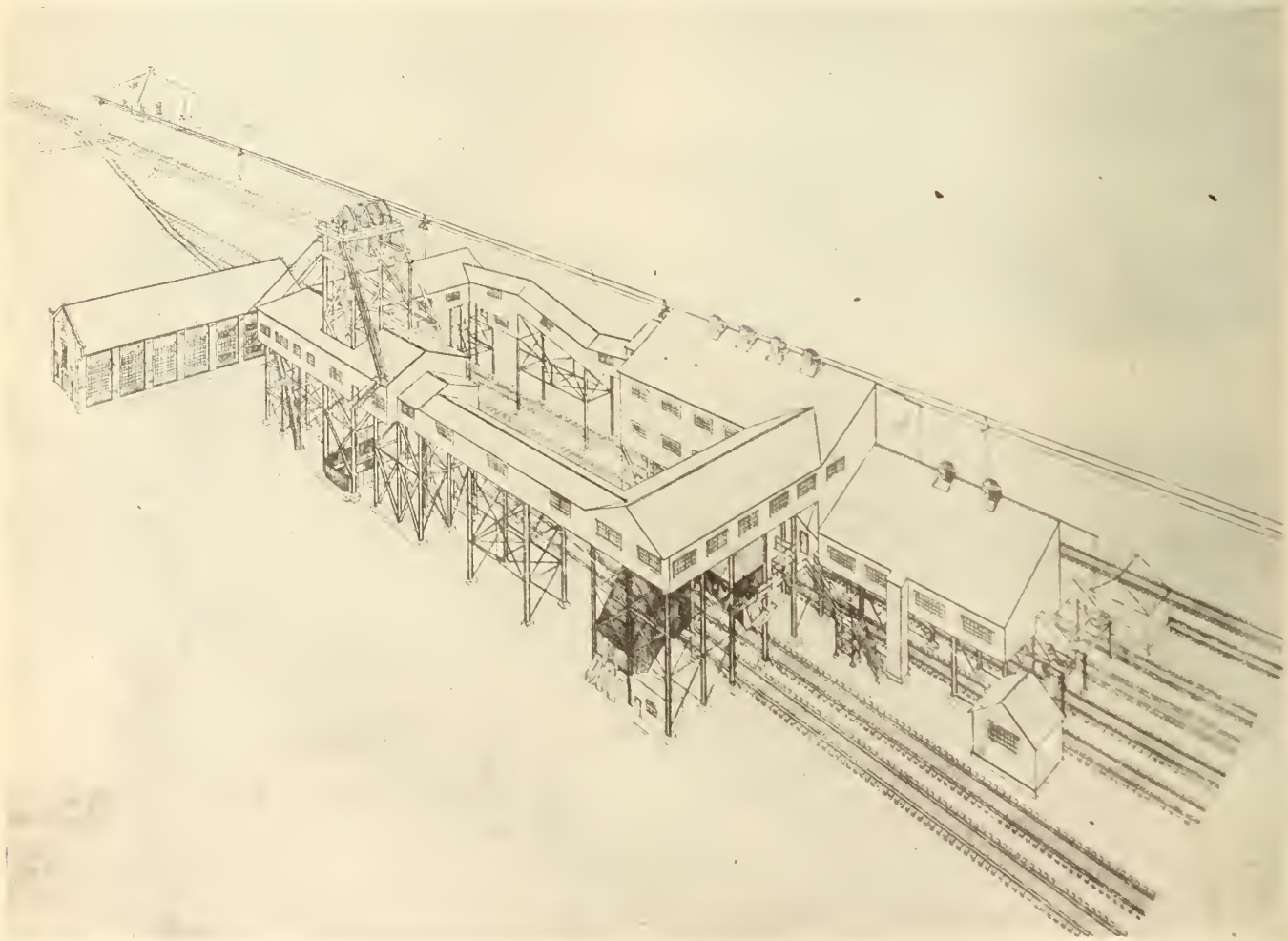
"It should be the duty of each and all of us, in every way as our opportunity offers, help, aid and assist in that future that it may be the most successful, that our province may occupy the high position we desire it should attain."

New Bankhead at Jubilee Colliery, Sydney Mines

Mr. A. Dawes, Divisional Engineer of the Nova Scotia Steel & Coal Company, presented a description, with a full set of plans, of the new coal-raising and screening arrangements at the Jubilee Colliery of the Nova Scotia Steel & Coal Company at Sydney Mines, now in course of construction.

The Jubilee Colliery operates on two seams of coal, respectively 560 and 740 ft. deep. The first bankhead was a temporary wooden structure, constructed of material largely picked up from other collieries. It was inconvenient in design and expensive in operation, and the growing output required a new bankhead of modern design.

The new layout consists of two electrically-operated hoisting engines, one for each seam; a structural-steel headframe, ninety feet high, a steel and concrete bankhead, with tipples and screening apparatus, and new surface buildings. The layout is designed to handle a daily output of 2,000 tons, but as not more than 1,000 tons daily is anticipated for some time, the construction being undertaken is designed for that output, and the other half of the layout will be added when the necessity arises. The expenditure presently undertaken



An Isometric Projection of the Pithead Arrangements at the Jubilee Shaft of the Nova Scotia Steel & Coal Co., Sydney in process of erection at this date.

is expected to reach $38,000. The new construction is proceeding concurrently with the operation of the old arrangements, and when the new work is completed the necessary turn-over will be made at a week-end. A saving of twenty workmen is anticipated, and a net saving of thirty-five percent on a daily output of 1,000 tons is expected to be shown, as compared with present costs of handling and preparing coal for market and other uses.

Coal Hoists: Two single-geared Vulcan hoists, driven by Westinghouse A. C. motors of wound-rotor type, working from a 2,200 volt, three-phase, 60-cycle current. Motors are respectively 550 h.p. and 350 h.p. for lower and upper seams. Gears are machine-cut, herringbone, working in oil-bath. Drums are cylindro-conical, with small diameter of seven feet and large diameter of ten feet. Automatic braking is provided by an auxiliary air-engine to guard against overwind, overspeed or power failure. Hoists will be housed in a brick building 97 ft. 6 ins. by 39 feet.

Structural-Steel Headframe. This structure will have front stays, departing in this regard from the usual type of back stays, this being decided by local conditions. Total height of headframe to centre-line of pulleys is 90 ft. and estimated weight of steelwork in headframe and bankhead is 460 tons. Structural steel is being fabricated by the Canadian Bridge Company.

Screening Arrangements. Full cars run by gravity and are automatically dumped into weigh-tanks. Empty tubs continue by gravity until picked up by a creeper conveyor which raises them to a height sufficient to allow them to return by gravity to the cages for sending back into the mine. Platform cages and skip-hoisting devices have not been considered for this mine. Screening arrangements are those usual in the Sydney field, and special care has been taken to avoid breakage of the coal, and for the loading of box-cars, railway business forming a large part of the outlet for Jubilee seam coal. Ottumwa conveyor-belt box-car loaders are being used.

Bankhead floors are of concrete, over triangular-mesh reinforcement. The whole structure is roofed in from the weather, protection from the elements being necessary in the exposed position of the Sydney Mines plants—which overlook the Atlantic—and adequate provision for lighting and removal of the coal-dust is provided. The structure is intended to be fireproof, and in designing it, the Company's engineers have endeavoured to build a structure that will not be unsightly.

The reader of the paper and the Nova Scotia Steel & Coal Company were thanked for presentation of the information to the Society, and congratulated on the permanent nature of the new surface arrangements at Jubilee Colliery.

A Mine Fire at Springhill.

Mr. John C. Nicholson, District Superintendant of the Dominion Coal Company for the Waterford District, and formerly Manager at Springhill Mines, read a paper describing the fighting and extinction of a mine fire at Springhill in 1916.

This fire broke out on November 26th, 1916 in the pipe-slope of No. 3 Mine at Springhill, at a point 1,050 feet from the mine mouth. This slope contained an eight-inch steam line running from the boilers on the surface to a mine pump at the 3,200 ft. level. The temperature of this slope was very high, and all the timber and coal dust was dried out by the radiated heat from the steam line. After ineffectual attempts to extinguish the fire with water from a two-inch line led from the surface, continuing over three days, it was found necessary to seal the mine, an operation shortly followed by a slight explosion that blew out the stoppings, sealed with clay were put in, and pipe led through each stopping to enable air-samples to be taken for analysis. Mr. Nicholson quoted a great number of analysis results showing the process of the extinction of the fire by accumulation of the products of combustion and the formation of an atmosphere incapable of supporting combustion. The "Journal" hopes to be permitted to reproduce Mr. Nicholson's paper in full at a later date, giving the progressive analyses, which illustrate how exactly the conditions in the fire area can be deduced from the percentages of oxygen and monoxide.

The operation of reopening and recovering the mine was accomplished by stages and by the building of stoppings in advance by men wearing smoke helmets (not oxygen breathing-apparatus). Oxygen apparatus were impossible because of the extraordinary heat, which reached at times 160 degrees, and the tarry products of coal distillation fouled the apparatus in a remarkable manner. Smoke helmets, with hose leading to cool air, enabled men to stand up to the onerous conditions of building the stoppings. A typical analysis, indicating the possibility of opening a stopping is as follows:

Co_2	7.0%
O	0.7%
Co	—
CH_4	11.9%

Mr. Nicholson called the attention of the members to the valuable assistance of systematic air-analysis, which he believed had not received the attention its usefulness deserves.

The genesis of this fire was doubtless in the heated condition of the pipe-slope, originating in the steam line. A turbo-compressor unit has since been installed at Springhill, and compressed air is used to operate the pumps, so that it is unlikely these conditions will recur.

Mr. Nicholson's paper is a readable, clear, and workmanlike account of the extinction of a mine fire, under difficult conditions, and he was heartily congratulated on making such a valuable contribution to the Society's transactions.

Opening of the Birch Grove Area, Cape Breton.

Mr. Robert Simpson, Manager of the Dominion Coal Company's No. 21 Colliery, presented a paper describing the opening of this district. The Dominion Iron & Steel Company purchased the areas of the Cumberland Coal & Railway Company in the Birch Grove area during the litigation between the Coal and Steel companies previous to the formation of the Dominion Steel Corporation, and the area was first opened up by Mr. D. H. MacDougall, now President of the Nova Scotia Steel Company, and later, the area came under the control of the Dominion Coal Company as a subsidiary to the Corporation.

The Birch Grove area consists of a narrow tongue of coal running inland from the sea at Morien Bay, having a dip of 30 degrees on the northern side of the synclinal basin, flattening out for 300 ft. in the trough, and rising gradually at about one in ten to the southern outcrop. From crop to crop at the point where the Birch Grove collieries are situated is only 2,500 ft. The seam is from 5 ft. 9 ins. to 6 feet thick. The shafts, Nos. 21 and 22, are slope openings. All the colliery operations are as far as possible electrically driven. The mines have always been operated reasonably cheaply, and the plant was designed with regard to the comparatively short life which the mines will have, because of

the limited reserve of coal at this point. Mr. Simpson's paper described the equipment and method of mining in full detail.

Visit to Halifax Shipyards.

The afternoon of Tuesday was spent in a visit to the plant of the Halifax Shipyards. The visitors were shown over the works, and afterwards entertained by Mr. J. E. McLurg the General Manager. About 1,230 men are at the present time employed at the Shipyards, and two 10,500-ton freighters for the Canadian Government Mercantile Marine are in process of building. One, the "Canadian Cruiser" will be launched in June, and the other, the "Canadian Contractor" about September next. A rather interesting feature, in connection with the British Empire Steel Corporation, and in view of the fact that the majority of the visitors were members of the staffs of the companies included in the merger proposal, was the presence, undergoing repairs, of a number of the freighters of the Dominion Steel Corporation, and two locomotives from Sydney Plant undergoing rebuilding. The ship-plates in use were also rolled at Sydney. The opinion was expressed by the visitors, in their thanks to Mr. McLurg, that while shipbuilding in Canada was passing through a period of hard testing, the Halifax Shipyards, because of its excellent site, geographical location, and its corporate connections, and its proximity to centres of artisan population, possessed more of the necessary elements of permanence than most of the shipbuilding enterprises in Canada.

In the course of the remarks referred to, the President of the Mining Society, Mr. George D. MacDougall, referred to the excellent work being accomplished in Nova Scotia by the co-operation of the Workmen's Compensation Board with the Nova Scotia Accident Prevention Association, and mentioned that Mr. McLurg was his successor as President of that Association, and congratulated him upon the evidences of solicitude for the safety of workmen to be seen upon the plant.

The Annual Dinner.

About seventy-five members and guests of the Society attended the Annual Dinner on Tuesday evening. The Lieutenant-Governor of Nova Scotia, Hon. McCallum Grant was present, with Hon. E. H. Armstrong, the Minister of Public Works and Mines; and the President-elect was in the Chair. The Secretary of the C. I. M. & M., Mr. Mackenzie, responded to a toast to the Institute. Mr. Armstrong referred to the close connection that has always existed between the Mining Society and the Mines Department. Hon. Robert Drummond, the veteran editor of the "Maritime Mining Record" received an ovation when he rose to speak.

MORNING SESSION OF THE 6th.

At the opening of the Wednesday meeting, Hon. Robt. Drummond, of Stellarton, said that the continuity of the Society's Transactions had apparently been broken by affiliation with the Institute, but is was explained that these were included in the annual volume of the Institute, not yet published for 1920. Therefore, save such papers as had been published in the "Bulletin", the papers read at the Glace Bay meeting in May 1920 had not yet been printed for distribution. Mr. Drummond thought the "Bulletin" could not possibly publish the papers presented before the Society, except by spreading their appearance over many months, and he deplored also the lack of full publication of the discussions upon papers that had previously been available when the Society had its own volume. Mr. T. J. Brown mentioned that at a previous date when the Mining Society had been merged with the Institute the question of inadequate publication of the papers and discussions of the Mining Society had led to reversion to separate organizations and he believed that the Mining Society would always desire to have an available record of its

The Graving Dock, Halifax Shipyard, Ltd.

own proceedings. Mr. F. W. Gray, as a member of the committee that recommended the terms of affiliation, stated that the question of publication was very clearly dealt with in the record, and mentioned that the Publication Committee of the Institute was at present considering how best to deal with the ever-growing number of valuable papers that are presented to the Institute and its branches. Mr. G. C. Mackenzie said that the Council would be glad to deal quickly, and as desired, with any recommendations on publication submitted by the Council of the Mining Society.

Longwall Mining at Jubilee Colliery, Sydney Mines.

Mr. John Murphy, Manager of the Jubilee Colliery of the Nova Scotia Steel & Coal Company, described the longwall method adopted for the mining of the lower Jubilee seam, which varied in thickness from two feet to four feet six inches, with sandstone roof and fairly hard bottom. Gateways were centred thirty feet, side pack walls being built from 4 ft. to 6 ft. wide, on either side of an 8 ft. gateway, which is brushed to give an average height of 6 ft. Thirty feet of face is given to each miner. Leading headways were driven with a Sullivan "shortwall" machine, places being 20 ft. wide with 50 ft. pillars intervening.

Undercutting on the longwall faces is done with a Sullivan bar machine electrically driven, undercutting 4 ft. 6 ins., which in this mine has been known to cut 120 ft. of face in nine hours. Horse haulage is now used, but later, when operations are more extended storage-battery locomotives will be used, both for gathering and for main haulage purposes. Haulages of this kind have proved very successful in the upper seam at the Jubilee shaft. Ventilation is easily effected, as packwalls are very tight.

No gas has been noticed in the mine since the longwall method was adopted, although it was present before. Freedom from gas is attributed to the well-directed and sweeping character of a ventilating current proceeding along the longwall faces.

Questions which were debated following the reading of Mr. Murphy's paper dealt with the relative merits of longwall when compared with the pillar-and-room system of extraction that has been so closely adhered to in mining in Nova Scotia collieries. Mr. Murphy believed there was no reason to fear additional difficulties with ventilation in longwall workings that had been a long time in operation, and, generally speaking, there was less loss of air and lower water-gauges in longwall mines than in pillar-and-room workings, especially where the pillars were left standing. Mr. J. C. Nicholson referred to the excellent results obtained by longwall mining in superimposed thin seams in the Joggins Field. F. W. Gray believed that general adoption of longwall method would be necessary to enable extraction of the superimposed submarine coal seams in Cape Breton. The room-and-pillar method, whether pillar drawing followed quickly upon the first working or not, tended to disturb strata to a greater degree than the longwall method. A very successful longwall operation had for years been carried on by the Dominion Coal Company in its No. 10 Emery mine, but a modified system of longwall had proved unsuccessful, and eventually pillar and room had been reverted to in a 4 ft. 6 ins. seam. Longwall, if adopted in all should

T. J. Brown, North Sydney.

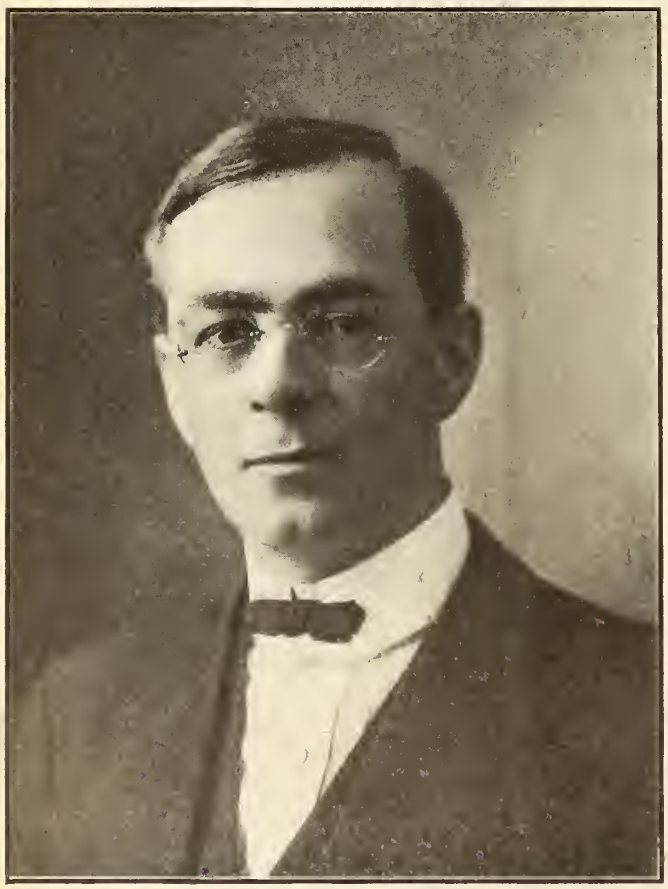
Alex. Macdonald, Glace Bay

be really and truly longwall, and not a mixture of two systems of extraction. Mr. T. J. Brown distinguished between subsidence and disturbance. He believed longwall allowed for equal subsidence, thereby avoiding distnrbance.

Conservation of Compressed Air.

Mr. J. P. Cotter, the Cape Breton representative of the Canadian Ingersoll-Rand Company read a paper on conservation of compressed air, which urged elimination of friction by making air-lines of proper size, and emphasised the necessity of avoiding preventable air-losses by metering the pressnres and carrying out systematic tests to detect leaks. He strongly recommended the use of after-coolers to ensure dry air, avoid water-hammer and the other numerous troubles that are associated with compressed air that is not dry and cool.

Mr. G. C. Mackenzie instanced a case that came under his observation where an insufficiency of air-pressure for power-hammers in a steel plant had been entirely remedied by increasing the size of the air-line. It was suggested that large-sized air-lines were very expensive, and it was fnrther suggested that where air-transmission was required over long distances underground it would tend to be superseded by electricity. Mr. Cotter replied that air-losses were also expensive, and he mentioned a compressed air-line in Europe, operated from a Taylor water-fall compressor, that conveyed compressed-air for 140 miles, with only an 18 lb. drop, in pressure due to transmission for that distance. Mr. Alex. MacDonald said the Dominion Coal Company had appointed inspectors of air-lines, and found that careful watching of the air-lines gave profitable results. He said one difficulty was to get a suitable valve for the machine connection. Mr. W. H. Graham, Construction Engineer of the Dominion Steel Corporation said skimped installations spelled decreased initial costs, but also expensive operating conditions, and small airlines were poor practice. Mr. Hiram Donkin said Mr. Cotter pointed out very succintly the necessity for eliminating friction in transmssion of compressed air, which he considered a self-evident requirement for economy and efficiency.



Prof. F. J. Sexton, Halifax.

Saving the Productive Power of Industrial Cripples by Vocational Training.

Prof. F. J. Sexton, whose work in connection with the vocational training work of the Department of Soldiers' Civil Re-establishment, has gained him a sympathetic hearing wherever he goes, contrasted the waste of war and of industry. The Canadian Expeditionary Force had suffered 55,000 deaths, and 250,000 casualties, out of a total force of 500,000 men. In the same number of years the industrial fatalities in Canada were 20,000 and the casnalties were 250,000. He pointed out that injured men lose their self-confidence and nerve, and gradually lose heart and descend in the scale of employment. He paralleled the arguments for the rehabitation of disabled soldiers with that of the disabled artisan. He explained how the science of occupational therapeutics had helped the soldiers in hospitals. A period of vocational training, averaging about eight months, has usually served to fit a disabled

Harry M. Wylde, Halifax.

soldier for a chosen occupation. By the co-operation of employers (which Prof. Sexton said had been cheerfully granted in Nova Scotia) disabled men had been trained for over 300 separate occupations at an average cost of $1,000. Thirty thousand had successfully completed courses, and three-quarters of them had held their places. The Department of Soldiers Civil Re-establishment was being rapidly demolished. It included many trained instructors, and he suggested that a nucleus from this organization should be retained for industrial vocational re-training. With regard to cost, the matter was partly national and partly of provincial concern, and also a matter of corporate industrial concern. The United States Government had already given a grant for vocational training of industrial cripples, stipulating that the individual states should spend dollar for dollar with the Federal Government. Over half of the states in the Union were co-operating with the authorities at Washington in this regard. If the Workmen's Compensation Boards were permitted by changes in the respective provincial acts they could usefully spend money in the vocational training that would result in great eventual saving, and in taking men entirely off the compensation funds in time. The Dominion Government had already set a precedent by assisting the provincial governments in technical education, and they might well include the vocational training of the cripples of industry.

William Donkin, Deputy Commissioner of Mines, Nova Scotia.

WEDNESDAY AFTERNOON SESSION.

Mr. Alex. S. McNeill, Superintendent of Mines of the Nova Scotia Steel & Coal Company, read "Notes on Mining Coal in the Submarine Areas at the Princess Colliery." Mr. McNeill said he had started out to prepare a paper on "Deep Undersea Mining, some of its problems and difficulties," but had found the subject was too large to prepare a paper upon in the time at his disposal, and he had been hindered by illness. Mr. McNeill's paper reviewed the history of the Princess Mine, probably the oldest operating mine in North America. The present shaft was sunk in 1868, and took until 1876 to complete, being at that time the most considerable engineering feat in coal-mining on this side the Atlantic. It is hoped, at a later date to publish Mr. McNeill's paper in full, but it may be stated that it detailed conditions of coal-mining that are unique. The roof in the Princess Mine is not good, and the floor consists of a plastic clay that weathers and flows or squeezes upwards to the roof in the room spaces intervening between the pillars, "seemingly with almost any proportion of pillar to room where the cover is 1,000 ft. or over." "To take this heaving bottom up" said Mr.

P. T. Henderson, Glace Bay.

McNeill, "accelerates its movement, and there are places filled by this upheaval from top to bottom. On the whole it is best not to touch it, but to gain any required height by brushing the roof."

The main haulage at Princess Mine is a perfectly straight road, 10 feet wide by 6 feet high inside the timbering, and extending 12,000 feet from the pit bottom to a point further out under the sea than any other submarine operation in Cape Breton. The cover is about 1,100 ft. at the face of this deep. At present, the coal is hauled from the new deep by plain rope haulage, operating a trip of 40 boxes, to a point about 9,400 ft. from the pit bottom. The coal is brought from the lower levels to this point a further distance of 3,000 ft by an auxiliary plain rope, fan-driven haulage.

"It is interesting to note that a plain-rope haulage is capable of operating over a distance of 9,400 ft. under a condition of 8,000 feet of eight percent grade and 1,400 ft. of six and a half percent grade, the road being straight. The writer thinks that this distance may serve as a example of the "ultimate" that may be accomplished by this system of haulage for similar conditions, and from this, possible conclusions may be drawn by any who contemplate plain-rope on haulage ways having a similar pitch. In other words, the best that could be done with a plain-rope haulage in this case was to get 40 empty pit-tubs weighing 1,000 lbs. each, to drag a one inch rope a distance of 9,400 feet." Due attention was paid to keep the rope from dragging by providing very wide rollers spaced every 50 feet. A motor-driven haulage, with engine installed at the head of the deep, is proposed for this deep.

The ventilation problem at the Princess is complicated by leakage and short-circuiting of air through fallen workings, in process of crushing at many points, rendering the keeping of tight stoppings very difficult. Mr. McNeill forecasted the necessity to supplement the ventilation of this mine by installing "booster" fans underground, in addition to the surface installation.

An attempt is to be made in No. 10 District South to take out the pillars almost simultaneously with the advance of the rooms. Levels are to be spaced 600 feet apart, headways carried up every 200 feet, rooms 16 ft. wide with pillars 30 ft. wide. Experience in pillar drawing indicated that in this mine, where the cover exceeded 1,000 feet, "some method must be adopted whereby pillars can be removed simultaneously with the advance of the workings."

Mr. McNeill's paper was properly regarded as an important communication, and the discussion that followed was taken part in by men who realised how much of the future of the submarine mining in Cape Breton depended on the improvements in practice that may arise from the pioneer operations of the oldest and most extended undersea mining operation in Nova Scotia.

Mr. J. C. Nicholson stated that coal had been mined at Springhill Mines under a cover of 2,500 ft. with the seam pitching 22 degrees, probably the greatest cover, accompanied by the heaviest pitch, of any mine in Nova Scotia, and only exceeded in Canada by conditions at Fernie. The conditions at Princess Colliery seemed to be abnormal, and associated with the heaving soft bottom, and not quite what might be expected from considerations of cover alone. He advocated retreating pillar-and-room system. At Springhill a system of retreating balances, with the drawing face of the pillars extending obliquely and completely across all the balances (self-acting inclines in rising headways) and the levels, had worked very successfully under the onerous conditions of pitch and weight of cover mentioned.

In answer to a question it was stated that the water-gauge at Princess was 4½ inches. Loss by leakage was fifty percent. Fan had a capacity of 250,000 c. ft. per min. but did not operate at full capacity.

Mr. Alex. MacDonald thought the great difficulty to be apprehended at Princess was that of ventiliation. He forecasted greater use of electricity in auxiliary haulage, fans and pumps.

Mr. John Murphy thought that if the longwall system was applicable to the conditions at Princess, the sticky bottom would make a very tight seal, and that under longwall conditions the ventilation problem would be simplified.

Hon. Robert Drummond mentioned his visit to Scotland recently where he had seen a mine that was working coal under the Firth of Forth. The "take" of collieries operating on either side of the Firth was 7½ miles, the Firth being 15 miles wide. Coal was being mined on a system of longwall advancing, with barriers, to protect the slopes, eighty feet wide. Asked what was the chief trouble facing the management he was told it was to get the men to and from their work. No fears were expressed regarding ventilation. Had not paid any dividend since the mine was opened, and did not expect to pay any dividend for fifteen years, but were laying out the mine for operations for one hundred years. Mr. Drummond suggested that two men from Nova Scotia should be sent over to see this particular operation.

F. W. Gray said depth of cover at Princess was not great, as there were many instances of coal being mined at much deeper covers without serious hindrance from weight of strata, nor were conditions at depths approaching or exceeding 1,000 feet in the neighbouring collieries in the Sydney field, found to be so onerous as at Princess. The conditions were evidently abnormal and presumably local, and could not be taken as an accurate criterion on which to base opinions regarding the recovery of the remaining submarine coal in the Sydney district. This presumably extended beyond the limit of mining, or at least, the balance of probabilities pointed to this conclusion. The use of roller-bearing axles for such a haulage as Princess suggested itself. The problem of the submarine coalfield, apart from the peculiarities of the Princess conditions, was that of transmission of power for long distances underground; and a much greater use of electricity underground, and some revision of ideas regarding the admissibility of electric appliances, and their statutary regulation seemed likely to be required. Thought that Mr. McNeill was modest when he stated that his paper was a recital of ordinary practice. It was very distinctly an account of extraordinary difficulties, unique in fact, and he considered the Scotia management were to be thanked for disclosing the extraction conditions of this mine, and inviting a discussion which might well be helpful. Mr. McNeill's statement that some method must be adopted whereby pillars can be removed simultaneously with the advance of the workings was in effect a description of the ideal extraction sought by a longwall system, and it was further suggested that the ventilation problem was a result of extensive pillar-and-room operations in which withdrawal of the pillars had been found impracticable.

Mr. McNeill said one difficulty in regard to longwall —even should it be found adaptable to conditions at Princess, and this was difficult because of the nature of the roof and the lack of packing material—was that a longwall face must be kept continually moving in order to prevent it from roof-falls, and continuous operation in some states of trade was difficult to arrange. Mr. Murphy suggested the trial of stepped longwall-faces. Mr. D. H. McLean, the Manager of the Princess Colliery gave further intimate details of the behavior of the roof and floor.

Central-Station Power for Colliery Operations.

Mr. Carl H. Marsh, Chief Engineer of the Dominion Steel Corporation, read a paper on "Central-Station Power for Colliery Operations." Mr. Marsh recited the difficulties attending coal-mining in Nova Scotia that made fuel economy and moderately-priced power a more urgent necessity than in mining districts with

easier physical conditions. The power requirements for mining purposes in Nova Scotia outweighed all other uses, and the increased economies possible with electric power, when compared with other prime movers, indicated that capital would earn most excellent returns in central power-stations for colliery operations. Such plants could be designed to use inferior grades of fuel, indeed some poor-quality seams might be operated entirely for power-plant consumption. With a number of electrically-operated collieries under one management, it is usually possible to arrange for fairly constant power demands throughout the 24 hours, especially where heavy pumping can be accomplished on the afternoon and night shifts.

Assuming annual station-output to average 60 per cent of rated capacity, operating costs, with coal at four dollars per ton delivered, would be about one cent per k. w. hour. Adding fixed charges, the cost would be about two cents. In times of slack demand, necessitating operating for a small current delivery, the cost would probably reach 2¼ cents per k. w. hour at the powerhouse, or about 2¼ cents per electrical horsepower delivered to the collieries through transformers, transmission lines and a distributing system. Construction of central power-stations larger than really necessary was to be guarded against, and with present high construction costs, colliery operators cannot usually expect inefficient but serviceable steam equipment to be replaced by new expensive and more economical electrical equipment until such time as the steam equipment becomes inadequate or inoperative.

Interconnected power-plants, as for example, in a district where collieries and steel plants are centred, are plainly advisable. That coal operators might advantageously sell power rather than coal was suggested as a matter worth consideration.

The President mentioned that as no part of Nova Scotia was further than thirty miles from the sea the question of condensation water was not difficult. He referred to the development of provincial water-powers as at St. Margaret's Bay and Sheet Harbour, and the possibility of the electrification of the Canadian National Railways; a matter that had been dealt with in a previous communication to the Society by Mr. Vincent McFadden. The hydro-electric power was not a competitor of coal-raised power. The province needed them both.

Mr. C. H. Wright, of the General Electric Company, said a scheme for electrification of the Canadian National Railways in Nova Scotia was already worked out, and it proposed one of the largest power stations near the Springhill Mines. Power stations should be interconnectable, and odd frequencies were to be strongly condemned. A standard of 60 cycle frequency was desirable, and was rapidly being adopted in the United States.

Hon. Robert Drummond mentioned the heavy fuel expenditure required for the haulage and pumping at the Inverness Collieries, and the operation of the railroad, and suggested that utilization of the Lake Ainslie waterpower would assist in helping the Inverness coal industry to survive, and would make it possible to open up the inland areas at Ste. Rose.

The general question of non-explosion motors and guarded switch gear was discussed, and it was stated that European practice in this regard was further advanced in adapting electricity to safe use in coal mines than it was on this side.

Relation of Mechanical Loaders to the Mining Industry.

Mr. Hugh B. Gillis, Superintendent of Mines and Quarries of the Dominion Iron & Steel Company, presented a paper describing the use of mechanical loaders at the iron-ore mines at Wabana, and discussing the possibility of adapting these devices to colliery requirements in Nova Scotia, which will be published in a later issue of the "Journal." As Mr. Gillis was unable to be present, his paper, and one by Mr. Angus W. MacDonald of Sydney were not discussed. Mr. Macdonald's paper was presented at the March Meeting of the Canadian Institute of Mining and Metallurgy in Montreal, and was noted in the issue of the "Journal" of March 11th (see page 191). The subject was the welfare work of the Dominion Steel Corporation.

Owing to the pressure of papers the Society was unable to take advantage of an invitation from the Imperial Oil Company to visit its refining plant on the other side of Halifax Harbour at Imperoyal. It is understood that the visit would have been fully worth while, but, as will be noted from the foregoing account, the Society had a long list of valuable papers to hear, and they wished to give them adequate discussion.

A notable feature of the meeting was the number of operating executives who attended the meeting and read papers bearing directly on their everyday experience. The discussions were taken part in by men whose business it was to solve the problems that were selected for review, and it would be difficult to find a gathering of men that could with more accuracy describe themselves as a technical society of miners. So far as "professional qualifications" are concerned the membership of the Mining Society of Nova Scotia cannot be impugned.

A partial list of those present at the meeting follows:

Geo. D. MacDougall, General Supt., N. S. S. & C. Co.

C. M. Odell, Engineer, Dominion Coal Company.

Alex. S. McNeill, Supt. of Mines, N. S. S. & Coal Co.

W. H. Graham, Supt. Construction, Dominion Iron & Steel Co.

T. J. Brown, Consulting Mining Engineer, North Sydney.

Neil Nicholson, Deputy Inspector of Mines, North Sydney.

G. A. McHattie, Asst. Engineer, Acadia Coal Co.

D. H. McLean, Manager, Princess Colliery.

W. Campbell, Supt. of Open Hearths, N. S. S. & C. Co.

Archie Ferguson, Inspector, N. S. S. & Co. Co.

Alex. MacDonald, District Supt. Mines, Dominion Coal Co.

E. G. Mackay, Supt. Iron & Steel Dept. Sydney Mines

P. T. Prendergast, District Supt. Mines, Dominion Coal Co.

J. P. McNeill, Manager, Florence Colliery, Sydney Mines.

John Murphy, Manager, Jubilee Colliery, Sydney Mines.

Thos. H. Hartigan, President Indian Cove Coal Co.

J. C. Nicholson, District Supt. Mines, Dominion Coal Co.

Professor F. J. Sexton, Halifax

Isaac Greenwell, ex-Manager, N. S. S. & Co. Co. Sydney

D. H. MacDougall, President, N. S. S. & C. Co.

Hon. Robert Drummond, M.L.A., Editor "Mining Record"

A. R. Chambers, Mining Engineer, N. S. S. & C. Co.

H. M. Wylde, Canadian Explosives Co., Halifax

(Continued on page 308)

SALE OF SHARES ACT, MANITOBA.

Commissioner has Power to Protect Public Against Fraudulent Promotions.

By REECE H. HAGUE, The Pas, Man.

It is astonishing how many reliable mining men, when questioned regarding their attitude towards wild-catting, remark:—"Let them go to it. Every mine is a wild cat until it is proved up, and it was wild-catting that has made many of Canada's greatest producing mines what they are today."

A certain amount of wild-catting is unavoidable in opening up new mining districts, it is true, but there is a vast difference between the optimism of the prospector, who invariably exaggerates his find, and the deliberate misrepresentation of conditions existing on a property for purposes of stock promotion.

It is optimism which imbues the prospector with the spirit enabling him to carry on and overcome almost insurmountable difficulties. Without optimistic prospectors Canada would never have produced a mine.

On the other hand it is the pessimism of the mining engineer which is responsible for protecting the large interests and the general public against the deep laid schemes of the professional mine-promoter.

The gullibility of the public is universally recognized and although it is impossible to protect them altogether, it is the duty, not only of the government, but of legitimate mining men, to offer what protection lays in their power.

That there is a sucker born every two minutes, as is so often maintained, seems to be born out by experience and notwithstanding the frequent warnings given the public, every get-rich-quick scheme ropes in a few more of the sucker fraternity, who listen open-mouthed to every proposition for making a million on a shoe string and fall invariably.

Even the most stringent laws for the protection of the public and the discomfiture of the men who prey upon their gullibility, afford loopholes, and it is probable that a great time will elapse before any scheme offering complete protection to those members of the community who fall an easy mark to the "assurance of great gain" type of advertisements will be evolved.

Certain of the provinces have enacted legislation of a protective nature for would-be investors in questionable mining stocks. During the past year several mining companies were refused permission to offer stock for sale in the province of Saskatchewan, including the Pan Extension, to which reference was made in an editorial in this journal recently.

In March 1920 various amendments were made to the Sales of Shares Act of Manitoba. These amendments provided that any company formed within the province must apply for and obtain a special certificate allowing for the sale of its shares, stocks and bonds or securities other than development shares, upon filing proof with the Public Utilities Commissioner that development work referred to in this section, and so far carried out, has demonstrated that there is a reasonable prospect of a return on the investment to the purchaser of such shares, stocks and bonds or securities.

Before such special certificate is granted the Commissioner shall require a prospectus of the company to be filed with him, setting forth the amount paid for the property in cash or stock, the amount of vendor or treasury stock, the names of the directors of the company and a description of the property, with such reports as are available. All advertising must conform to the facts set forth in the prospectus and must specify that the prospector is on file for reference at the office of the Commissioner.

In the event of mining companies failing to comply with the regulations as set forth it rests with the Commissioner to take steps to bring them to book. Legal authorities state that the Commissioner's powers extend to advertising done in other provinces by companies granted their charter in Manitoba.

While it is natural that many companies will sail close to the wind it is the duty of the government to see that these laws are complied with and to make an example of any companies which ignore them.

Having vested themselves with these powers the government should handle them wisely. Untold harm to a district can be done by indiscriminate advertising on the part of stock promoters, and it is in the interests, not only of the public, but of the mining profession, that further legislation of a protective type should be evolved and strictly adhered to.

One of the most reprehensible practises carried on largely by certain stock promotion companies is to extract one portion of a competent mining engineer's report and display it in their advertisements, absolutely ignoring preceding or succeeding paragraphs which might convey an entirely different impression. If a mining engineer's report is quoted in advertisements it should be quoted fully, and accurately or not at all. In the writer's it would not be going too far to make misrepresentation of a mining engineer's report a criminal offence.

NOTE.—If the Commissioner, as noted by our correspondent, has power to extend his inquisition of stock issues to representations made outside the Province of Manitoba, it would be very much in order to check up the literature of the Pan Extension Gold Mine. Our esteemed contemporay, the "Northern Miner" says "This is the Manitoba outfit that has been trying to lure servant-girl money out of Toronto by means of the most extravagant exaggerated advertising, assaying 2,000 pounds pure bunk to the ton." It is further pertinently remarked that advertising of the Pan Extension type will undermine the confidence of business men in the highly promising fields of Manitoba "faster than years of careful effort will build it up." A Winnipeg correspondent, for whose fairness and ability to form a judgment we can vouch, informs us that Manitoba is now the resort of "about all the sure-thing, confidence men from the U.S.A., who have sold more than forty millions of stock, face value, in unproven claims." Another friend of the "Journal" who is legitimately interested in the development of gold mines in the Rice Lake District, writes that "fabulous tales of wealth spread broadcast through the press by entirely wrong methods" are deterring capitalists from taking advantage of the many real opportunities that do exist in Northern Manitoba. If the Government of Manitoba does not protect the reputation of its potential mining areas against the horde of crooks that have foregathered there, a sad reckoning is coming to many people.—Ed.

Mr. A. W. Newberry has returned to New York. He arrived in Toronto a short time ago after being for some time in Nicaragua.

Northern Ontario Letter

THE SILVER MINES.

The Cobalt District.

From this date forward there is promise of an increase in activity in the mines of Cobalt, the turn for the better having become noticeable this week. In contrast to a gradual narrowing down in work, and reduction of staffs, there is now a tendency to add to the number of men, and the outlook is better than since near the beginning of the year.

Provided silver continues to command around 57 cents an ounce, plus from 10 to 12 p.c. premium on United States funds, the mines now in operation will continue to realize sufficient profit to encourage them to operate. These include the Nipissing, O'Brien, Coniagas, La Rose, Bailey, and Chambers-Ferland.

Among the closed-down properties which may be counted upon to be among the first to join the active list is the Mining Corporation. This company is making quite extensive alteration to its mill, and by the expenditure of about $20,000 will provide facilities to treat close to 300 tons daily as compared with 200 tons formerly. These alterations may be completed within the next four weeks, and at that time the company is expected to reach a decision as to whether work is to be immediately resumed, or held in abeyance pending a return to lower operating costs, or a higher price for silver. The question is a difficult one, and during the course of interview with a number of mine managers, your correspondent finds opinion swings strongly to the belief that the most economical policy is to keep these old mines in operation even though the cost of work is almost as great as the value produced. It is contended that the cost of re-opening old mines after a period of idleness is quite excessive and that the better plan is to mine the ore and produce the silver, even though it may for the time being amount to only really a conversion of treasury dollars into silver bullion. Provided the treasury may be sufficiently strong, the bullion may be held in storage, to be sold if possible at a point which may leave a margin of net profit.

At the Coniagas Mines, work is being carried on at full capacity. This enterprise represents one of the most remarkable achievements in the history of silver-mining in the Cobalt district. This mine, in spite of the poor market for silver, is being operated successfully on ore which contains an average of only eight ounces of silver to the ton. By most strict economy and the highest possible degree of efficiency, this company appears to be holding costs down to between $3.50 and $4 a ton, a record which is lower than any other in Northern Ontario with the possible exception of the Dome Mines at Porcupine. Were this company to endeavor to reduce the scope of its work, the per ton cost would automatically increase and perhaps lead to a shut-down. However, this point is fully recognized, as a consequence of which work is going ahead at full capacity and the adverse situation which has closed other mines has been successfully combatted at the Coniagas.

A strengthening in quotations for silver to around 75 cents an ounce would probably lead to such mines as the Temiskaming, Beaver and Kerr Lake resuming production.

A stabilizing influence in Cobalt has been the finding reached by the Board of Conciliation which recently took evidence here in connection with the wage reduction. All members of the Board, including the representative of the men, expressed the opinion that the mines were really obliged to make the cut, and this reduction of 15 p.c. was sanctioned unanimously, the lower rate to go into force at April 1st. This will reduce by from three to five cents an ounce the cost of producing silver. A note on the findings of the Board is contained elsewhere in this issue of the "Journal."

At the 410-ft. level of the Chambers Ferland mine good results continue, and a quite large amount of high-grade ore has been taken out. As stated officially some time ago, the silver content amounts to upwards of 5,000 ounces at times, while the wall-rock also contains good milling values. The ore occurs close to the boundary of the Nipissing.

A shipment of concentrates made from the Bailey during the past week was the most important shipment to date from this property since the consolidation of the Bailey-Cobalt and the Northern Customs into what is now known as the Bailey Silver Mines. This company is meeting with very promising results, and officials of the company express themselves as being well pleased wth the new management under Mr. G. C. Bateman.

The Peterson Lake Company has under consideration a scheme to raise additional finances with which to conduct work pending more favorable conditions for production.

South Lorrain District.

Pumping operations on the Keeley Silver Mines, preparatory to a general resumption of work on this property has caused renewed attention to be directed to that district. The only other property under operation is the Haileybury Frontier, where work is being done with the object of recovering cobalt metallics and cobalt oxide, with silver as a by-product.

There are a number of promising properties in this district, and should the Keeley achieve the success which its comparatively large amount of ore of a good grade would tend to indicate, it is considered quite reasonable to expect to see a number of other properties re-opened for exploration purposes.

Elk Lake and Gowganda.

Permission has been received to increase the authorized capital of the Silverado Mining Company to 3,000,000 shares of the par value of $1 each, as compared with 1,000,000 shares of $1 each. This company owns a large group of mining claims in the Gowganda district, some little distance south west from the Miller Lake section. A large number of veins have been opened up in which native silver occurs. It is planned to place the company in a position where a comprehensive scheme of exploration and development work may be carried out this summer.

Ore and Bullion Shipments.

During the week ended April 8th the O'Brien was the only mine to ship ore from Cobalt. This company sent out one car containing approximately 61,000 pounds of ore.

During the corresponding period, no bullion shipments were made, although the Nipissing is at date of writing sending out a large consignment made up of 76 bars weighing 99,881 ozs.

THE GOLD MINES

The Porcupine District

For the first time since the depression of gold mining by war conditions, the gold producers in Northern Canada are placed in a position to operate at full capacity. Great mining plants which were erected some years

ago, but which could not be operated because of shortage of men, high costs of operation and, more recently, a shortage of hydro-electric power; may now be worked at full capacity.

Mines in the Porcupine district alone are equipped to produce close to three tons of gold bullion every thirty days, and the work of speeding them up is already well under way at the leading mines, and is being planned at the smaller properties.

The Hollinger Consolidated has been taking on larger forces of men, and as a part of the plan to feed the mill at full capacity of an average of 3,200 tons daily, 30 additional mining machines have been placed on order. At this property, the engineering staff alone exceeds 30 members, while the clerical staff also ranges between 30 and 40. The number of underground workers when running at capacity will exceed 1,000 men. The present management has adopted a policy of establishing main haulage-levels at every 125 or 150 feet below the 425-ft. level, to prevent congestion where the main haulages lie to widely-separated intervals. Accordingly, haulages have been established at the 425, 550, 675, 800, 950, 1,100 1,250, 1,450 and 1,550 ft. levels. Heretofore, the 425 ft. and the 550 ft. have been the main haulage levels and the greater part of the $40,000,000 so far mined has been taken from the ore-bodies lying about these levels. Accordingly as required, however, main haulages will be installed at the lower levels above mentioned.

Within a very short time, the McIntyre-Porcupine will bring its mill up to full capacity of 600 tons daily. In the meantime, also, additional equipment is to be installed, while underground arrangements are being made to provide about 1,000 tons of ore daily when required. The result of work at the lower levels, and the decision to enlarge the mill, offers promise of the McIntyre running the Dome Mines a close race for the position of being the second largest gold-producer in Canada.

The Dome Mines is making preparations of great magnitude, although officials remain exceedingly reticent in regard to what may be expected. Considering the adverse conditions in the power situation during the past winter, the company closed a prosperous fiscal year on March 31st. Milling operations average only about half capacity, and at this rate the dividend of 10 p.c. was provided as well as adding to surplus. It will be about six weeks before the annual statement becomes available, however, and until that time the details of the past year's work will not be possible to secure. In view of the showing made as gathered from the more or less meagre details available, the Dome will establish an exceedingly favorable record with its mill running at full capacity.

At a special meeting of the stockholders of the Porcupine-Keora, a scheme was ratified whereby the company will sell two of its claims to a newly organized three million share company, of which the Porcupine-Keora will hold two million shares. The remaining million shares will remain in the treasury to be sold as a means of providing money for further work. The president of the company refused to issue a statement in regard to the values encountered in the long crosscut at the 250-ft. level, and some of the shareholders expressed open dissatisfaction over this attitude. The president, however, would not yield, and merely stated that further work would be required before a conclusive statement could be made.

Kirkland Lake District.

Good results are reported at the Teck-Hughes. Mill heads are stated to have been increasd to upwards of $11 a ton, while the coast of operation is being held down to under $8 a ton. In new orebodies recently developed, the gold content is said to be higher than the average heretofore encountered, and the future of the enterprise has taken on favorable aspects.

Albert Wende, general manager of the Wright-Hargreaves returned this week from Buffalo and will proceed immediately with the final arrangements to start up the newly-installed mill.

The shaft at the King-Kirkland has reached the 100-ft. level, and assay results have continued favorable to that depth. A mud-seam is present in the vein, and considerable importance is attached to this. Considerable water is flowing through the mud-seam at the first level and this has necessitated pumping operations.

Larder Lake District.

In connection with a petition recently presented to Premier-Drury by about forty of the stockholders of the Goldfields, Ltd., the following is a memorandum for Hon. H. Mills, Minister of Mines, from the Provincial Secretary, Mr. H. C. Nixon, under date of March 5th.

"You will recall forwarding me copy of petition received by you from the stockholders of the above company, praying for an investigation into the physical and financial affairs for reasons set forth.

Attention to this matter has been somewhat delayed by the fact that the Ontario Companies' Act does not provide for any method by which investigations into the physical and financial affairs of the company can be made except by virtue of section 126 which provides, that there must be a petition by one-fifth in value of the shareholders of the company.

I would suggest however, that the petitioners appoint a small committee and that this committee draw up a set of interrogations either with or without the help of the Department.

The Department can then demand that the company answer these interrogations."

The above is interpreted as an indication that the Ontario Government intends to offer assistance to minority stockholders in mining companies.

Boston Creek District.

A meeting of the shareholders of the Miller Independence Mines is being held for the purpose of deciding upon a scheme to further finance the work. The company still has about 100,000 shares in its treasury, but of the 56,000 shares sold during the past year or so at $3.80 net to the treasury, some of the purchasers have defaulted in payments, and the company has been temporarily embarrassed. For the time being, therefore, all work has been suspended at the mine, and will only be resumed following an adjustment of the present situation. In the statement sent out by the secretary of the company, the remark is made that conditions at the mine never before warranted operation to such an extent as at present. The suspension of work is temporary and purely due to finances.

FINDINGS OF THE CONCILIATION BOARD AT COBALT.

Messrs. John M. Godfrey, Robert A. Bryce, and A W. Roebuck, constituting the Board of Investigation and Conciliation appointed under the Industrial Disputes Act to adjudicate in a dispute between the employees at the silver mines at Cobalt and the mine

operators, have reported findings to the Minister of Labour under date of March 28th. Seven hundred workmen are stated to have been directly concerned. The dispute arose as the result of a notice sent out by the employers on January 8th, announcing a reduction in wages of 75 cents per day effective after the 15th February. The reason given for the reduction was that the decreased selling price of silver made it impossible to work the silver mines at a profit. The report and recommendation of the Board is as follows:

"Various conferences took place between the employers and the employees and a proposal was finally made by the employees that the reduction in wages should be distributed over a period of three months, at the rate of twenty-five cents per month. This proposal was refused by the employers and a Board of Conciliation was then requested by the employees and granted. In the meantime the proposed reduction had not been put into effect.

After hearing the statement of both parties to the dispute, it was proposed by the Board that a private conference should be held by the Board with representatives of the employers and the employees for the purpose of considering an amicable adjustment of the dispute. This conference took place on Wednesday the 25th of March.

During the course of the discussion it was proposed as a solution of the difficulty that the employers should continue paying wages at the present rate until April 1st, 1921, after which date, in view of the low price of silver, the reduction of seventy-five cents a day should become operative.

This proposal was accepted by both parties subject to it being confirmed on behalf of the employees at a mass meeting to be held in Cobalt on Sunday, March 27th, 1921.

This mass meeting of the employees was held on the 27th day of March, and was attended by about two hundred and fifty employees of the seven hundred affected. The meeting rejected the proposed settlement.

The Board regrets the rejection of the settlement which had been approved by the Committee representing the employees and which was the best which could be obtained in view of the present difficult situation.

The Board recommends that the reduction in wages of seventy five cents (75c) per day be deferred until the 1st of April, 1921."

The wage reduction became effective at April first, and no complaint has been heard. The unanimous finding of the Board discounts the influence of a small faction that strenuously opposed the reduction in face of all the unmistakable signs of depression in the silver market.

MONTREAL METAL QUOTATIONS.

Following are fair average prices for ingot metals (in less than car load lots) at Montreal

	April 6	April 11
Copper, Electro	17	17
Copper, Casting	16 1/4	16 3/4
Tin	31	31
Lead	6	6
Zinc	7	7
Aluminum	34	34
Antimony	7 1/4	7 1/4

TORONTO MINING STOCK QUOTATIONS.

Quotations on Active Stocks on Stndard Stock Exchange for Week Ending April 9th.

Silver	High	Low	Last
Adanac Silver Mines, Ltd.	1 1/2	1 1/8	1 1/8
Bailey	3	3	3
Beaver Consolidated	35 3/4	35 1/4	35 1/4
Chambers-Ferland	7	6 1/2	6 1/2
Coniagas	1.90	1.90	1.90
Gifford	1 1/8	1 1/8	1 1/8
Great Northern	2 1/2	1 7/8	1 7/8
Hargraves	1 1/4	1 1/4	1 1/4
La Rose	23	21	23
McKin.-Dar.-Savage	17	17	17
Mining Corp. of Canada	1.00	1.00	1.00
Nipissing	8.45	7.65	7.80
Peterson Lake	8	6 1/2	6 3/4
Silver Leaf	1 1/4	1 1/4	1 1/4
Temiskaming	25	24	24
Tretheewey	13 1/2	12 1/2	13
Gold			
Apex	1 1/2	1 1/2	1 1/2
Atlas	12	8 1/2	11
Boston Creek Mines	10	10	10
Dome Extension	62	60	61
Dome Lake	3 1/2	3	3
Dome Mines	18.75	18.50	18.75
Gold Reef	4	3 1/4	3 1/2
Hollinger Consolidated	7.00	6.90	6.92
Hunton Kirkland G. M.	10	9 3/4	9 3/4
Keora	16 1/4	12	16
Kirkland Lake	51	48 1/2	49
LaBelle Oro M.	35 1/2	30 1/2	36
Lake Shore M. Ltd.	1.16	1.11	1.16
McIntyre	1.98	1.91	1.91
Moneta	13 1/2	11	13 1/2
Newray Mines, Ltd.	6 1/2	6	6 1/2
Porcupine Crown	21	20	21
Porcupine V. N. T.	20	19	19 1/4
Preston East Dome	3	3	3
Skead	53	50 1/2	53
Schumacher	24	21	23
Teck Hughes	12	11 1/2	11 1/2
West Dome	7 1/2	6 3/4	6 7/8
West Tree Mines Ltd.	5	5	5
Oils			
Rockwood Oil, Gas	3	3	3
Vacuum G.	9 1/4	7	9 1/4

COAL PRICES

Toronto, April 13. Production in the bituminous fields continues to go lower, the total, according to figures in possession of Toronto dealers, representing a reduction of fifty per cent as compared with December last. Continuation of this lessened production means that there must be a stronger market before business reconperates, and this depends upon the buyers. Smokeless is quoted at from $8.00 to $8.50 and lump at $7.50 to $8.50 according to quality. Toronto prices. Slack is $6.25 to $6.75, Toronto, Canadian funds. There is a fairly free movement of anthracite especially by the line companies, while the independents are having some difficulty in moving domestic supplies, especially steam sizes. It is complained that the household consumers are not co-operating with the retail dealers in putting in their winter supplies of coal, as a result of which the retail dealers are likely to have their yard stocks at capacity.

SUDBURY NOTES.

D. E. CUSHING.

From statements made by I. F. Hellmuth at the hearing in regard the M. J. O'Brien injunction against the refinancing plans of the British American Nickel Corporation, it would seem that much depends on the decision of Mr. Justice Middleton as to whether the injunction proceedings shall be made permanent or dissolved. In reserving his decision, the judge intimated that the interests should get together, and undoubtedly he is working to that end, for Mr. Hellmuth, as spokesman for the National Trust Co., trustees under a bond mortgage, made it quite plain that his clients were fearful of delay in reaching a settlement, and he was quite positive that a delay of one month would mean the wrecking of the Corporation.

The whole affair seems to size up as a battle of financiers, and this point was quite plainly brought out by the O'Brien interests in defending their injunction proceedings. They stated that the refinancing plan was really a move on the part of interested Norwegian capital to get a better security for their money. The Norwegian interests hold $10,000,000 debenture stock and the O'Brien counsel pointed out that at present there is not a sixpence of security for this.

The same interests are also the holders of most of the twenty millions of common stock. The contention set up was that the reorganization would give to certain Canadian security holders, a degraded security and at the same time place the unsecured Norwegian holdings on a parity. It was also contended that a claim of the Bank of Commerce, $2,000,000, which has no security on the assets of the company, was being put ahead of that of the plaintiffs.

In the meantime certain underground work is being undertaken at the property, starting on a small scale and to be increased steadily so that there must be those in the company who can see some daylight ahead.

The Bousquet Gold mine at Howery Creek is starting operations this week. The shaft has been sunk to the 300-ft level. It is intended to undertake lateral work at the 100-ft. level.

OBITUARY.

J. L. Englehart.

J. L. Englehart, late Chairman of the Temiskaming & Northern Ontario Railway Commission died, in his seventy-fourth year, at Toronto on the 6th April, and was interred at Petrolea.

Mr. Englehart became Chairman of the T. & N. O. Commission in 1905, and held the office for fifteen years. He has taken a leading part in the development of the oilfields of Ontario. He obtained the charter of the Imperial Oil Company in 1880, and is stated by Mr. Stillman, president of the Company, to have been the sole surviving member of the original incorporation who continued to occupy a seat on the board. "For many years past, however," Mr. Stillman states, "Mr. Englehart devoted his energies and his great abilities to objects of a public and philanthropic character." Mr. Englehart's benevolence had endeared him to very many. His name was given to the well-known divisional point on the T. & N. O. Ry., and few men have been more closely connected with the development of mining in Ontario, or have devoted more conscientious attention to public duties and private charity.

FUTILE PROSPECTING FOR COAL.

The Sudbury "Star" states that at Chelmsford, in an area twelve miles west of Sudbury, on the line of the Canadian Pacific Railway, diamond-drilling is proceeding in a search for coal. As the formation is Upper Huronian, the "Star" is not far wrong when it states that "from a geological standpoint the proposition is considered a joke". Mr. McVittie is stated to have carried drilling operations in a search for coal to a depth of 3,007 feet. If ever the rocks at Chelmsford included organic material capable of carbonization, this must have reached a stage of complete graphitization. Such occurrences in pockets are not inconceivable, but that any bedded coal-seams could exist in the neighborhood of Sudbury, is not conceivable to students of coal substance. The Editor of the "Journal" has been asked for advice on the advisability of searching and staking for coal in such unlikely neighbourhoods as Kingston, Ontario, and Swastika, Ontario. What's the matter with Alberta?

EARLY SPRING HELPS GOLD MINERS.

The warm weather last week made a big impression on the lakes and rivers that supply water to the power plants that drive the mining and milling machinery at the gold mines. The mine operators have been preparing for the event and hundreds of workmen are at hand ready to take part in the increasing of production. On Wednesday word was received that a full supply of power is now available and the people of Timmins knowing what that means, are preparing for a busy year. At the Hollinger the supply of power will now permit the production which was hoped for long ago; but which owing to shortage first of labor and then of power has until now been impossible. The Hollinger should in a few days be treating 3000 tons of ore per day. Increases not so great but also notable can be made in a short time at the Dome and McIntyre. Other properties in the Porcupine area will help to swell the production of gold this summer and the mines at Kirkland Lake will also make much larger production.

PERSONALS.

Mr. Robert J. Bell has resigned the position of general manager of the Maritime Coal & Railway Co. at Joggins Mines, and will take a short rest. Under Mr. Bell's direction the Maritime Company has successfully mined thin coal-seams under the sea by long-wall, using electric coal-cutters. There is not probably in Nova Scotia a coal-mining operation so difficult that has been better managed. The operations of this Company are now rendered difficult by the fact that the miners' union is demanding adherence to the increased scale of wages arranged by the so-called "Montreal Agreement" last Autumn, which it is probable the smaller mining companies in Nova Scotia will find themselves unable to pay.

Mr. John Preston, Superintendent of Power for the Nova Scotia Steel & Coal Company, has resigned that position.

Mr. J. B. Tyrrell has returned to Toronto after spending some weeks in Alberta and the Western States.

Mr. Jas. McEvoy of Toronto is in Mexico examining mineral properties.

Mr. Bert Latilla has arrived at the Lough-Dakes mine, Kirkland Lake.

New Caledonia Mineral Production

Nickel and Other Substances.

A Note by Dr. W. G. MILLER, Toronto.

As is well known, the French island colony of New Caledonia in the South Pacific at one time controlled the world's markets for both nickel and cobalt. With the development of the nickel industry in the Sudbury area of Ontario, New Caledonia came to play only a minor part but continued to have a successful nickel business. Cobalt occurring in such large quantities as a by-product in the Ontario silver deposits, discovered in 1903, resulted in the total destruction of the cobalt mining industry in the French colony for a considerable time. During the year 1920, however, owing to the high price that has been asked for cobalt metal and its compounds, mining of the ores of this metal was revived in New Caledonia and 66 tons of cobalt matte were shipped.

In addition to nickel and cobalt, New Caledonia has been famed as a source of chrome ore. The Tiebaghi mine is one of the world's best known producers of this ore.

During the last two or three years the island has become a producer of manganese ore and a small quantity of copper ore has also been exported. Phosphate is shipped from some of the adjacent islands.

In the last pre-war year, 1913, the value of the minerals, mattes and ores exported from New Caledonia was approximately $1,700,000, doubtless a low valuation, which is equal to say $33 per capita. As less than 40 per cent of the population is white, the per capita mineral production of the island compares more than favourably with that of most other countries. The mineral production of Canada, for instance, in 1913, is given as $18.77 per capita and that of the United States as $25.16.

For export purposes in 1920, ores and mattes in New Caledonia were valued approximately as follows:

Nickel Ore.	the moist ton.
5.74 per cent and under	62 francs
6 to 6.24 per cent	75 francs
6.25 to 6.49 per cent	80 francs
6.50 to 6.74 per cent	85 francs
Nickel Matte.	**the kg. of metal contained.**
40 per cent and under	2.50 francs
40 to 45 per cent	2.70 francs
45 to 50 per cent	2.80 francs
50 per cent and above	2.90 francs

(The nickel in a 50 per cent matte is thus valued, for export purposes, at approximately 25 cents per pound, par of exchange.)

Cobalt Ore.	the moist ton.
4 per cent and under	80 francs
4 to 5 per cent	100 francs
5 to 6 per cent	130 francs
6 per cent and above	170 francs
Cobalt Matte.	**the kg. of metal contained**
25 per cent and under	5 francs
25 to 30 per cent	5.50 francs
30 to 35 per cent	6.00 francs
35 per cent and above	6.50 francs

(Approximately 56 cents per pound for cobalt in a 35 per cent matte.)

The older of the two prominent companies operating in New Caledonia, with refining plants in Europe, is La Société le Nickel. It was incorporated in 1880 with a capitalization of 6,250,000 francs. In 1898 the capital was increased to 10,000,000 francs, in 1912 to 15,000,000 and in 1918 to 20,000,000, divided into 80,000 shares of 250 francs each. The net profits during the ten years 1908 to 1918 ranged from a low of 3,122,000 francs to a high of 7,321,000, showing that the company has met with much success in its operations.

There is an ad valorem tax of 3 per cent on all ores and mattes exported from New Caledonia.

The following is a free translation of articles in the *Bulletin du Commerce* of Nouméa on the mineral production of New Caledonia, December 17th and 24th, 1920, and later issues. Weights are given in metric tons. The value of the statistics is enhanced by the data given on the production of individual companies and the quantities of ore and matte shipped to various countries.

"The value of our mineral exports for 1918 was 2,149,110 francs less than for the year 1917 (i.e. a complete war-year) and the value for 1919 showed a further decrease of 2,999,684 francs as compared with 1918, or a total reduction of 5,148,794 francs for the two years following the war.

"It is useful to publish the value placed on our ores, and mattes, according to their metal content, for export purposes, from the year 1917:

Nickel Ore.

	1917	1918	1919
	frs.	frs.	frs.
From 5.75 to 6%	69	69	69
From 6 to 6.25%	75	75	75

Nickel Matte.

	frs.	frs.	frs.
From 40 to 45%	2,700	2,700	2,700
From 45 to 50%	2,800	2,800	2,800
Above	2,900	2,900	2,900

"The following tables gives the countries for the six last years to which our minerals have been exported and the amounts in tons:

	Nickel Ore. Tons.	Nickel Matte. Tons
1914.		
France	23,380	
England	14,126	2,494
Belgium	16,346	2,157
Germany	7,906	
United States		305
Australia	96	
1915.		
France	14,935	1,109
England	36,611	600
United States		3,519
1916		
France	7,806	783
England	20,129	800
Japan	2,713	
United States		3,852
1917		
France	2,880	200
England	15,836	1,170
United States	2[illegible]	1,191
Japan	3,276	

1918.		
France	12,259	400
United States	.....	3,537
Japan	3,352	.....
1919.		
France	1,509	1,000
England	52	.....
United States	.....	2,508
Belgium	.....	304

"The tables given above clearly indicate the different countries to which our minerals are exported and also show that France plays only a secondary part in the nickel industry. As regards the mineral chrome almost the total exportation has been to the United States, principally, and to England a smaller quantity.

"Foreigners thus hold almost a monopoly in nickel-refining and a complete monopoly in the manufacture of chrome-steel.

"During the year 1914 our producing exporters of the ores and mattes given in the tables above were the following:

	Nickel Ore. Tons.	Nickel Matte. Tons.
1914.		
Sté Le Nickel	54,699	2,194
Hauts-Fourneaux	11,059	2,762
De Béeade	15,623	.....
Sté du Mont Dô	2,800	.....
Cie des Mines de Niekels réunies	9,973	.....
1915		
Soeiété Le Niekel	48,576	1,400
Hauts-Fourneaux	.....	4,129
1916.		
Soeiété Le Niekel	27,735	1,583
Hauts-Fourneaux	2,743	3,352
1917.		
Hauts-Fourneaux	3,301	4,949
Soeiété Le Niekel	28,716	1,370
1918.		
Hauts-Fourneaux	3,552	3,537
Société Le Nickel	12,259	400
1919.		
Hauts-Fourneaux	.....	2,931
Soeiété Le Nickel	1,509	881
Bonzon	50	.....
Brouk	1	.....

Nickel Ore.

The exportation from 1907 in tons and in francs:

	Tons.	Francs.
1907	101,707	3,559,068
1908	120,028	4,200,939
1909	82,028	2,486,780
1910	115,342	3,087,465
1911	120,059	3,601,709
1912	74,312	2,526,444
1913	93,190	2,858,635
1914	94,154	2,824,020
1915	48,576	1,562,716
1916	30,679	1,706,935
1917	32,018	2,506,584
1918	15,600	1,150,768
1919	1,560	112,165
1920	91,534	.....

"The exports of nickel made by La Société des Hauts-Fourneaux from Nouméa to the United States Nickel Company of New Brunswick, owing to various causes, were approximately 1,800,000 francs (1,412 tons) less in 1918 than the production in 1917.

"The figures for the value of nickel ore given in the table should receive a little consideration as the differences shown in value and quantity do not seem absolutely exact. It must not be overlooked, however, that our Departments of Customs and Mines encounter the greatest difficulties in obtaining accurate statistical information regarding the values of the ores exported by the companies interested.

"The amount of nickel ore exported in 1919 is shown as 1,560 tons, compared with 15,600 tons in 1918. This difference is to be attributed to two causes: the first is that La Société le Nickel, the only company which for several years has exported nickel ore to either France or England, must have a considerable stock on hand; the other is the lack of boats. It has been impossible for this company to charter boats for New Caledonia.

"It is moreover certain that the exportation of nickel ore will decrease more and more, owing to the high cost of transportation and the development of the smelting industry at Thio and Nouméa. Fortunately the change in our mineral industry has stopped the costly shipment of ore containing only 7% metal.

"The time when New Caledonia exported from 120,000 to 140,000 tons annually is past.

Nickel Matte.

Exportations in Tons and Values of Nickel Matte.

	Tons.	Francs.
1910	768	705,197
1911	2,993	2,137,622
1912	5,098	3,600,033
1913	5,862	3,753,791
1914	5,287	3,625,567
1915	5,529	4,219,798
1916	4,935	4,371,215
1917	6,318	7,582,550
1918	3,937	4,998,559
1919	3,812	5,563,019
1920	4,509	.....

"The following is a comparative table showing the countries to which our mattes were shipped from 1913 with quantities in tons:

	France	England	Belgium	U. S.	Total
1913	938	1,500	3,424	.....	5,862
1914	...	2,523	2,458	305	5,287
1915	1,409	600	.....	3,519	5,529
1916	783	800	.....	3,351	4,934
1917	400	969	.....	4,948	6,317
1918	400	...	.....	3,537	3,937
1919	1,000	...	304	2,508	3,812

Nickel Matte.

"The quantity of ore, with an average metal content of 5.50 to 6%, smelted into mattes by the furnaces at Pointe Doniambo (Hauts-Fourneaux) and at Thio (Société Le Nickel) amounted to:

	1918 Tons	1919 Tons
Hauts-Fourneaux	42,600	42,000
Soeiété le Nickel	20,000	18,000
Totals	62,600	60,000

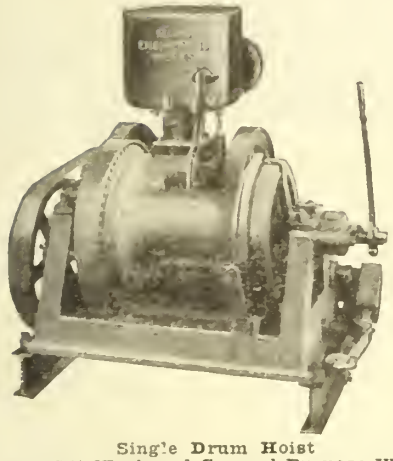
"In 1916 and in 1917 the total amount was approximately 60,000 tons for each year.

"In adding the amount of ore treated to that export-

GASOLINE HOISTS

IDEAL FOR PROSPECTORS

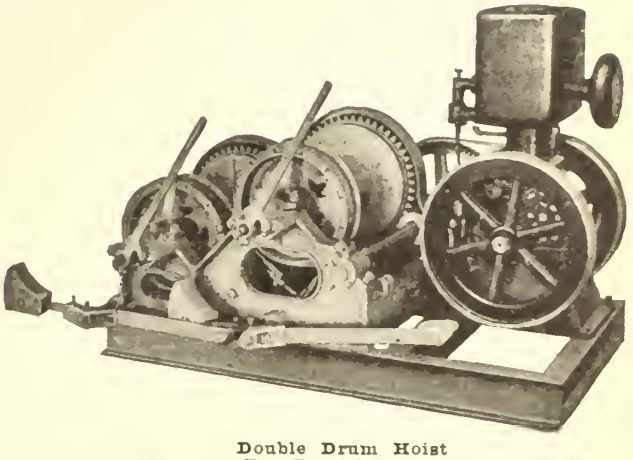
For Developing Claims, and for Operating Small Mines, Quarries, etc.



Single Drum Hoist
For Pit Work and General Purpose Work
Made in Two Sizes, 6 H.P. and 10 H.P.

What One Customer Says.

"—You can fully believe that no money could purchase our machine from us if we were unable to replace it." —(Name on appication.)



Double Drum Hoist
For Derrick Work
Made in Two Sizes, 6 H.P. and 10 H.P.

GASOLINE HOIST SPECIFICATIONS
For both Single and Double Drum Machines

Horse Power of Gasoline Engine Regularly Supplied	Diameter of Drum or Drums	Length of Drum or Drums	Depth of Drum Flange	Weight lifted or Pulled on a Single Line	Hoisting or Pulling Speed per Minute	Estimated Shipping Weight with Engine		Code Words of Hoist Complete with Engine	
						Single Drum Hoist	Double Drum Hoist	Single Drum Hoist	Double Drum Hoist
TYPE A 6 H.P.	9"	15"	4¼"	1650 lbs.	120 feet	1800 lbs.	2400 lbs.	Gabardine	Gallic
	12"		5"	1240 lbs.	160 feet	1850 lbs.	2500 lbs.	Galaxy	Galleon
	14"		4"	1065 lbs.	186 feet	1900 lbs.	2600 lbs.	Gammon	Gamut
	16"		3"	930 lbs.	213 feet	2000 lbs.	2800 lbs.	Gannet	Gandes
TYPE B 10 H.P.	12"	20"	5"	2750 lbs.	120 feet	3300 lbs.	4700 lbs.	Gabion	Gamboge
	14"		4"	2360 lbs.	140 feet	3475 lbs.	4800 lbs.	Ganglion	Gauntlet
	16"		5"	2060 lbs.	160 feet	3575 lbs.	5000 lbs.	Garland	Garnet
	18"		4"	1830 lbs.	180 feet	3700 lbs.	5250 lbs.	Garrote	Gavel
	20"		3"	1650 lbs.	200 feet	3925 lbs.	5500 lbs.	Gazelle	Gastric

Note—All the above specifications are for our standard machines fitted with the standard size of Gasoline Engine, as listed at the left of above schedule.

AN UNSOLICITED TESTIMONIAL

Dear Sirs:-

Regarding the 6 H.P. Single Drum "MARSH" Gasoline Hoist that I purchased from you last August I take pleasure in advising you that this machine met the requirements perfectly and would say that it is giving entire satisfaction in every respect.

I am using this Hoist in my coal mining operations, for the purpose of hoisting the coal about eighty feet. At present I hoist one half a ton of coal per load and hoist about ten tons every 90 minutes, with one man operating Tipple Head and Machine.

The cost of operating this machine for the work as specified is approximately 50 cents, possibly less.

Yours very truly,
(Name given on request.)

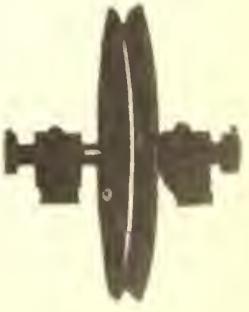
Steel Mine Buckets
Any Size or Design You Want

MARSH ENGINEERING WORKS, LTD.

Established 1846

BELLEVILLE, ONTARIO

Sales Agent: MUSSENS, LIMITED, MONTREAL
TORONTO, WINNIPEG, and VANCOUVER



Overhead Sheaves
With Shaft and Boxes

ed the following result is obtained, giving approximately the production from our mines:

	Amount Exported Tons	Amount Treated by our Smelters Tons	Total Tons
1916..	30,679	60,000	90,679
1917..	32,000	70,000	102,018
1918..	15,611	62,600	78,214
1919..	1,560	60,000	61,560

"These figures are interesting to compare with those of former years before the smelters were in operation and the crude ore only was shipped to France and foreign countries."

SHAFT SINKING.

The "Journal" is in receipt of an interesting brochure from the E. J. Longyear Co. of Minneapolis which, among other things, mentions contracts carried out by this company at the Flin Flon mine, in Manitoba, at the Ankerite shaft in the Porcupine field, and the Morrison Shaft at the Goudreau Mine of the Nichols Chemical Co. The views given convey a somewhat Arctic idea of Canada, but a company with the name of Longyear should feel at home in such conditions, Longyear City, on Advent Bay, Spitsbergen, six hundred miles within the Arctic Circle, being, we believe named after Mr. Longyear, and possessing the distinction of being the furthest north of any mining enterprise of its magnitude.

At Flin Flon, the Longyear Company sank two shafts, and cross-cutted and drifted on the ore body at the one hundred, two hundred and three hundred foot levels.

THE MINING SOCIETY OF NOVA SCOTIA.

(Continued from page 299.)

E. Godfrey, Canadian Explosives Co., Montreal.
E. C. Hanrahan, Secretary, Sydney.
A. Dawes, Divisional Engineer, N. S. S. & Co. Co.
K. H. Marsh, Chief Engineer, Dominion Steel Corporation.
J. P. Cotter, Canadian Ingersoll-Rand Co.
Hiram Donkin, Deputy Commissioner of Mines and Chief Inspector, Halifax.
C. H. Wright, Canadian General Electric Co., Halifax.
G. C. Mackenzie, Secretary, Canadian Institute M. & M.
W. W. Morley, Supt. N. S. S. & C. Co., Halifax.
E. S. Saunders, Secretary Board of Trade, Halifax.

EDITORIAL

National Limitations

The proceedings of the parliamentary fuel-committee are proving useful in disclosing varying points of view, which is always to be desired, so that corrections in fact may be adduced which may modify opinion. Mr. H. E. Vaughan, vice-president of the Canadian National Railways, when he complained that Nova Scotia coal operators will not sell coal at a price which will compare favorably with the quotations of American operators, evidently assumed that this was a matter subject to the volition of the coal operators. Here Mr. Vaughan is entirely in error. So are many others, as is evident from newspaper comment on this incident, and there is an impression abroad that the high selling cost of coal in Nova Scotia is caused in the first instance by incompetence of management and in the second intance by "a desire of the operators for excessive profits". Mr. Vaughan compares an f.o.b. price of $7.00 per ton at Sydney, Nova Scotia, with a delivered price including freight, duty and exchange —at Port Arthur of $6.75 per ton for U. S. coal. This seems, and is, a wide differential in favour of U. S. coal, but not unnatural or unreasonable, if the conditions are examined.

Coal sent from the United States to Canada amounts to two and one half percent of that country's production. At this time, with steel production at the lowest ebb in relation to capacity in history, quotations for United States coal for Canadian delivery are unrepresentative, and represent dumping and distress sales. It is also well known that coal coming to Lake ports is an outward—practically a ballast cargo—in the iron-ore trade, and coal in this instance indulges in what the trade calls "a free ride". Canada, at this time, represents to the United States coal-trade (which is not clearly distinguishable from the steel trade of that country) a convenient outlet for disposal of coal, with selling prices a secondary consideration. In other words, the export of coal from the United States to Canada is a sideline. It is not the sole support of the coal interests, and indeed, the United States could lose all the Canadian coal business and never notice it. The bituminous collieries of the United States can lose more coal production in a week of enforced idleness arising from the slackness in steel demand than would supply Canadian requirements for a year. That is one phase of the matter.

The cost of coal production is from two to three dollars a ton greater in Nova Scotia than it is in the United States, and it must always be that way. The reason lies entirely in the easier natural conditions of coal disposition and extraction in the United States, where coal is present in greater abundance, of better quality, and can be more cheaply mined than anywhere else on Earth.

If Canadians wish to remain Canadians, they must accept Canadian limitations. The ultimate cost of coal to Canada is not to be measured with the yardstick of dollars and cents. If it is argued that to abandon such a yardstick is an economic sin it may be argued with equal cogency that Canada's whole national status is possibly an economic sin, but it is a darling sin to many people, and thousands died for its perpetuation.

Coal is being mined in Nova Scotia under conditions of natural difficulty that would break the heart of the average mine manager in the United States. Few people realise that there is not a bituminous mine in the United States at a greater depth than one thousand feet. There are only a few mines left in Nova Scotia that are not at much greater depths than this. And yet we have a sneaking regard for the competency of Nova Scotians, and we believe the prosperity of the Nova Scotia coal trade is not a matter of indifference to Canada, seeing that it is all the coal we have to call our own in that part of Canada where most of the Canadian population resides—at least at this stage of national evolution.

The British Empire merger is being blamed for sky-blazing prices and eliminating competition. We have an idea that is the reason for the merger. Once before, in 1893, the coal trade in Nova Scotia was resurrected by a merger, that of the Dominion Coal Company. The necessity was no less at this time, because, to put the matter very badly, a stage has now been reached in Nova Scotia when the cost of the production of coal exceeds that price for which it can be sold. A chief

probably the chief reason for this condition, is that coal was sold too low in the past, and in this regard the railways were the chief oppressors.

For eighty years, that is from 1830 to 1910, the coal output of Nova Scotia increased by a geometrical progression of 78 percent. per decade. Had this increase continued through the decade ended with 1920, that period should have shown an output of 81 million tons. It actually amounted only to 55 million tons. There is reason to believe that the production for the current decade may not greatly exceed that of 1911-1920. It certainly will not if the Canadian consumer refuses to make allowance for the difficult natural conditions under which coal is mined in Nova Scotia. It would be much more to the point if the people of this country would cease talking about its illimitable resources, and would realise that, in sober fact, our natural resources are in some of their most notable phases, distinctly limited in quantity, relatively expensive to develop; and that, unless we make the best of what we have, unless we put our one talent to work, we shall in due time, be relieved of ownership of even that which we now have.

There are certain economic laws that are as inexorable and as ruthless as the laws of biology. One of these laws is that continued economic dependence brings eventually political subservieney. Those who everlastingly look to another country for cheap goods may not wish to see Canada lose her political autonomy, but they are working to that end, some thoughtlessly, others from desire for ease, and others maybe from conviction. The last-named class are at least honest, and they form the least considerable danger to national autonomy.

It would be refreshing if some clear-sighted parliamentarian would combat the loose talk of our "illimitable" resources, would analyse that irritating lie that our resources have "not been even scratched", and similar hyperbole. Uniformed optimism is dangerous. Needless pessimism is foolish. We need someone in Parliament that will tell this country of the glorious future it will have *if*—and it is a large if—its people will realise that its resources are not greater than its needs. Also that we might just as well be without any natural resource we possess and do not utilise.

THE PROPOSED INCREASE IN ONTARIO PROFITS TAX.

There seems now to be a possibility that the proposal to increase taxes on profits of mining companies in Ontario will not result in unfavorable legislation. There has been a great deal of opposition in the Legislature to the Government's bill and predictions are made that it will be withdrawn. It is to be hoped that consideration of the possible ill-effects of the measure will make it evident that the Government should not press for its passage. Productive enterprises are having difficulties enough aside from those that are avoidable.

PUBLICATION OF C. I. M. & M. PAPERS.

The monthly review in the Institute's bulletin for April raises a point discussed in the account of the proceedings of the annual meeting of the Mining Society of Nova Scotia in the last issue of the "Journal", which was written before the "Bulletin" was out. The Secretary of the Institute asks that reading of papers should be made secondary to the discussion, and suggests the prior printing and distribution of papers to this end. It would appear that there was general agreement as to the desirability of this course.

A further advantage from prior publication is that the information contained in the papers presented to the Institute is given quick publication, and the advantage attendant is well illustrated by the two papers on the northwestern oil prospects by Messrs. Ness and Kindle that are reproduced from the April "Bulletin" in this issue. Owing to the fact that the "Bulletin" is a monthly publication, limited in space content, it was not possible to publish these papers therein under a period of one month from the time of reading. Some consideration might be given to the question whether withholding of publication of such papers in the technical press until after their appearance in the "Bulletin" has advantages to the individual members that outweigh the suppression of the duty the Institute owes to the public at large.

There has been significant agreement in the addresses of the officers of the Institute extending over the past two years that the Institute had not altogether lived up to its opportunities in educating the public in mining matters, which, put in another way, means that the publications and discussions of the Institute have failed to secure that circulation among the public at large that only the periodical press can give.

It is fairly evident that the number of papers which will be presented at Institute meetings from now on, at headquarters and branch meetings, is far beyond the capacity of the Bulletin to hold, even were it doubled or trebled in size. The worth of some papers consists largely in their timeliness and topicality, and such papers, if not published at once, are soon not worth publishing. So far as the public press is concerned, information is only "news" while it is new. We doubt whether is is fair to an author to delay publication of such a paper, and it certainly robs the Institute of that publicity which, if not seized today, is gone tomorrow beyond hope of regaining.

We can scarcely regard the fact as one considered as desirable by the members of the Institute that its members are far better informed of the papers and discussions read before the Institution of Mining & Metallurgy and other British technical societies than they are of their own Institute's proceedings. Full text of papers, with verbatim report of the discussions, appear in the British trade journals within two or three days of the actual presentation.

This journal does not conceive it to be its function to quarrel with the rulings of the Institute. It has hitherto, and will continue to abide by them, but while we believe every loyal member of the Institute is willing to give of his best to the Institute's proceedings, still, if he has anything to say he wants the public to hear it. *What is still more important, he wants the public to hear about the Institute before which his paper is read.* This is really the main point.

Canada is so vast, her mining camps so scattered, that every available avenue of publicity for the Institute's affairs should be hailed with gladness, because it is lack of publicity, lack of interchange of technical information and news, lack of cohesion arising from the great distances that intervene between the Institute's members, lack of freshness and recent contact, that is the Institute's heaviest handicap.

The Bulletin is a link between the members, and the more it adheres to the idea embodied in its name — which was not unthinkingly chosen—the greater will be its usefulness as a bond of communication, news, "shop" and friendliness, but its inability to contain all the technical papers that are presented to the Institute should be admitted. If, on the other hand, a paper is of such admitted excellence that it is destined for the Annual Transactions without intermediate appearance in the Bulletin, the author must wait twelve or maybe eighteen months before his paper appears. Inclusion in the Transactions, no matter how select and honouring such selection may be made, is no consolation to an author who wrote something that was worth while and was sufficiently human and afflicted by life's little vanities to wish to see his work in print and in circulation among those who would be likely to notice his little venture.

The Editor of this journal has probably attended more of the annual meetings of the Institute in the past two years than anybody else, and has endeavoured to report the proceedings as fully as possible. No objection has been made to his doing this, and no restriction has been placed by the Institute on the extent to which the proceedings were reported, but it has only been by special favour and request that he has been allowed to handle the actual manuscripts, and reproduction of the text is forbidden. The logicality of this distinction is hard to see. Many technical societies take care to have a plentiful supply of separates for distribution before the reading of a paper, with the result that all such papers receive special notice and often complete reproduction from the daily newspapers and the technical press. The reluctance of the Institute to divulge its papers has quite opposite results, and it loses a good deal. What it gains, or hopes to gain, by forbidding quick publication of papers has never been satisfactorily explained, and possibly it has never been thought out. Or again, the original reason may have lost its cogency.

The past-President, in his retiring address, said the Institute considered itself the voice of the mining industry in Canada. How can that voice be heard if it is silenced to all but the limited membership of the Institute itself? And how can the public be interested and informed if publicity is discouraged?

BRITISH COAL STRIKE.

The persistence of the miners' leaders in Britain in placing a constitutional question before a question of wages and hours led to a well-merited rebuff. The country was quick to see the weak point in the miners' case. The railwaymen and transport workers were unenthusiastic over the prospect of a general strike, and indifferent, if not hostile, to the protestations of the miners, because they are well aware of the preferred status of the miner alike in regard to remuneration and working hours and general working conditions. Mr. Lloyd George's brief request that the railwaymen and transport workers would state the reasons for their desperate action was a rapier-thrust that pierced through the wordy fog and vagueness with which the miners had surrounded an ultimate purpose that was by no means vague.

The miners' leaders have not a single vision to the needs of the British miner, or the British nation. Their thinking is continental, and is confused with the communist idea. They counted on outside aid. They desired to alter the law of private ownership in Britain, and they pursued this seditious and subversive aim by confusing their followers with vague terms summed up in the word nationalization. One English paper states that the bluff was called. There was no bluff, so far as the leaders of the miners is concerned. There was, and is, a deliberate and dangerous purpose, and it is a tribute to the clear-thinking of the British people that they detected this malign intent and rose to oppose it. The cause of the miners' strike will be found recorded in the minutes of the Miners' Congress at Geneva.

NICKEL COINAGE.

The Government is to be congratulated in introducing nickel coinage. The amount of the metal which will be required for an issue of five-cent pieces will not be a matter of great importance as an aid to production, but Canadians generally will be pleased that the country is making use of a metal that has found much favour in other countries because of its intricate merits as a coinage metal, and which is, moreover, a distinctive Canadian product.

It is to be hoped that the design of the new coin will be more artistic than the copper one cent piece. This is without doubt one of the ugliest coins ever minted. From the viewpoint of artistic execution it has not a redeeming feature. Put side by side with specimens of the beautiful French and United States coinage it is revealed as lacking in beauty to a painful degree.

"CORRESPONDENCE-SCHOOL MINING ENGINEERS."

A well-known mining paper recently referred to "correspondence-school mining engineers" in slighting terms, and suggested these gentlemen should perform their mining engineering by correspondence. The Chesterfieldian warning against attacking a class is well illustrated by this attitude, for mining students who have taken correspondence courses, in Canada at least, are a large and influential body of men. To many aspiring miners in Canada there was no other way in which technical education in mining could be obtained except through correspondence lessons. To be classed among correspondence-school men in Canada is to be included among men who added to their daily work in the mine (no eight hour day at that) considerable expenditure in money for correspondence-school fees and nightly study under conditions not always conducive to mental effort. Were all "correspondence-school engineers" to be deleted from the roll of the mining profession in Canada it would be a sick looking list, and, if we mistake not, there would be some notable names missing in the United States also.

A college degree in mining may be a greater tribute to the old man's purse than to a young man's ability, and it is not part of the tradition of our institutions of learning in Canada to despise the men who did their best with the meagre facilities the country has afforded, and in more than one instance have risen to eminence in technical attainments and to affluence that has enabled them to endow colleges, the necessity for which they have learned from bitter personal experience.

The desire for elevation of the technical professions, for severer tests in professional attainment, and for elimination of the fakir are noticeable and commendable tendencies of these days, but there is some danger that the possession of a college degree may come to be accounted as equivalent to the possession of personal qualifications for leadership, which, as all industrial executives know, it certainly is not. Many a man who was forced by stern necessity to content himself with the education that a correspondence course would afford will strain his pocket to give his boys a chance, that was denied to himself, by sending them to college, but it will be taking a good deal for granted to say the sons will be better men than their fathers.

Our contemporary, in referring to "correspondence-school mining engineers" probably had in mind a thoroughly disreputable class of pretenders that infest some mining centres. Such men are conspicuously absent in Canada. Our only object in making this comment is to point out that the large list of mine officials that have taken correspondence courses in this country are doing their mining engineering, not by post, but on the job. They are, moreover, doing it pretty well and saying darned little about it.

We do not desire to belittle the high status which a fully qualified mining engineer should reach. His studies cover as wide a range — if not wider — than those of medical men, lawyers, and other typical closed professions. They cannot, however, be measured by the same yardstick, and pharasaism is about the last thing that the mining engineer desires to cultivate as a professional characteristic.

THE FLIN FLON DEAL.

There has as yet been no official statement given out concerning the reported sale of the Flin Flon Property, Northern Manitoba, to a syndicate which includes the Mining Corporation of Canada and English interests. There seems however to be a strong probability that the Flin Flon mine will be developed by Canadian and British Capital. The enterprise is one of great magnitude and the negotiations now under way will have an interest for a large number of people other than the contracting parties. The future of the Pas mineral district will be largely determined by the progress made at Flin Flon.

WESTERN TOUR OF C. I. M. & M. SECRETARY.

Elsewhere in this issue will be found the itinerary of the western tour proposed to be undertaken by Mr. G. C. Mackenzie, the Secretary of the Canadian Institute of Mining & Metallurgy. It is a document that speaks for itself, and will speak still more eloquently at 5.05 a.m. (daylight-saving time) some fine morning after the night before, unless the Institute has fallen upon the dumps of decadent desiccation. We wish the Secretary success in his endeavour to unify the membership.

UNITED STATES BITUMINOUS OUTPUT TO DECREASE BY 100,000,000 TONS FROM 1919 FIGURES.

One of the best informed men in the coal industry, who is in touch with conditions throughout the country, predicts the 1921 output of bituminous coal will be 100,000,000 to 125,000,000 tons under that of last year.

This means a production for the present year of 430,000,000 to 455,000,000 tons. Last year's production was well above average with 556,563,000 tons. 1919 production of 458,063,000 tons was light because of the carry-over from the banner year of 1918, when production ran up to 579,385,820 tons.

The drop this year will be due to heavy production through the latter part of 1920. Industries accumulated large stocks, while curtailing operations then and later. The railroads, which consumed about 20 per cent of our output or 113,574,127 tons, will consume about 20 per cent less this year, due to the 30 per cent drop in traffic. Also the foreign demand, which took about 21,000,000 tons of high-grade coal last year, will probably be extremely small this year.

The railroads paid an average price of $4·20 per ton for their coal in 1920. This official estimates they will pay less than $3 and possibly close to $2.50 per ton at the mines, in 1921. He states roads are contracting for Illinois coal at $2·85. A 1,000,000-ton contract for another grade was recently closed at less than $3 per ton.—"Boston News Bureau."

The Search for Oil in the West

A NEW LEAF IN CANADA'S RECORD

A paper read before the Canadian Institute of Mining & Metallurgy, at the Annual Meeting, Montreal, March 3rd, 1921, by J. NESS, of the Geological Department of the Imperial Oil Company, Limited, and reprinted from the April bulletin of the Institute.

Being the record of a continental search for petroleum, extending from the "Cities of Alberta to the Arctic Ocean", based upon and guided by geological deductions, following up by intensive prospecting and deep drilling the trail marked out by the Canadian Geological Survey; adding thereto the most recent teaching of oil geology, and culminating, after years of work and the expenditure of much money, under unique conditions of climate and transportation, in the proving of a gushing well on the verge of the Arctic Circle.

Introduction

WITHOUT undue exaggeration it may be said that the eyes of all Canada are fixed on a spot in the far-away Northwest Territories where the derrick of Imperial Oil, Ltd., marks the first well to successfully tap the alleged fabulous oil-resources of that little-known region.

This venture has taken hold of the public imagination to such an extent that one can hardly lift a newspaper without seeing some aspect of the case discussed, whether it be the fatherly interest of the Government in a new source of potential revenue, the avaricious plans of the speculator to dip into the public purse, the problems of development and transportation which confront those most vitally interested, or the legitimate curiosity of the scientist in happenings which may conceivably add to his knowledge.

It is but natural to assume that the interests of such an institute as this are purely academic and that no time need be spent in dealing with the commercial issues. We will, therefore, attempt to give a short résumé of the activities of our geologists, the broader results of their field work, and the steps being taken to follow up and test their conclusions with the drill.

When it is stated that the area which Imperial Oil is testing extends from the plains of Saskatchewan on the east to the foot-hills of the Rockies on the west, and from the international boundary on the south to within the Arctic circle, it will at once be recognized that the geological aspects are many and various and can only be indicated, or dealt with superficially.

It appears, however, that this vast extent of territory may be conveniently divided into three groups, in which the geological features are so dissimilar that each carries its own particular problem. First, we have the Cretaceous rocks of eastern Alberta and Saskatchewan, practically undisturbed and heavily covered by glacial material. Secondly, the folded and faulted Cretaceous of the foot-hills belt, the outer folds of which give a certain amount of promise structurally. Thirdly, the Devonian of the Mackenzie valley in which oil has recently been struck.

Eastern Alberta and Western Saskatchewan.

So much has already been written regarding the geology of the plains area that we need only briefly recapitulate the outstanding features.

Speaking briefly, the structure of this area is monoclinal, although there are certain local irregularities and undulations, and evidence of two general lines of folding. The first of these, which is the continuation of the structure found in the Sweet Grass hills of Montana, probably extends north to Bow river. The second crosses the Alberta-Saskatchewan boundary south of Macklin and trends northwest.

The efforts of the Imperial Oil geologists have centred upon these known, or assumed, lines of folding or faulting which previous investigation has indicated as likely to repay attention; but a general survey—of necessity, hurried and incomplete—has been made of the whole region as far north as Lac la Biche, south to the international boundary, east to Battleford and west as far as the Cretaceous rocks are exposed.

Most of the exposures in this vast area were visited and examined, a task entailing in many places, more travelling than actual geological work, owing to the dearth of rock sections. Hundreds of square miles have been traversed without a single outcrop of bed rock being seen, the streams having simply cut their courses in the extremely thick glacial deposits. Nothing revolutionary was discovered during these surveys, the previous work in the area leaving little to the imagination.

Attention was devoted principally to the selection

of suitable locations for testing the oil possibilities, those areas where the minor folding and crumpling would conceivably create conditions suitable for the accumulation of oil, and the supposed crests of the broad arches which bring the sands of the Dakota nearest to the surface being studied in detail.

Previous development in this area has resulted in the hope that oil will be found in commercial quantities provided the drilling is carried to a sufficient depth. Various gas horizons have been successfully tapped and "shows" of oil have been encountered, and it is only by exploring the lowest beds of the Cretaceous and, if necessary, the Devonian, that these hopes will be either realized or dissipated.

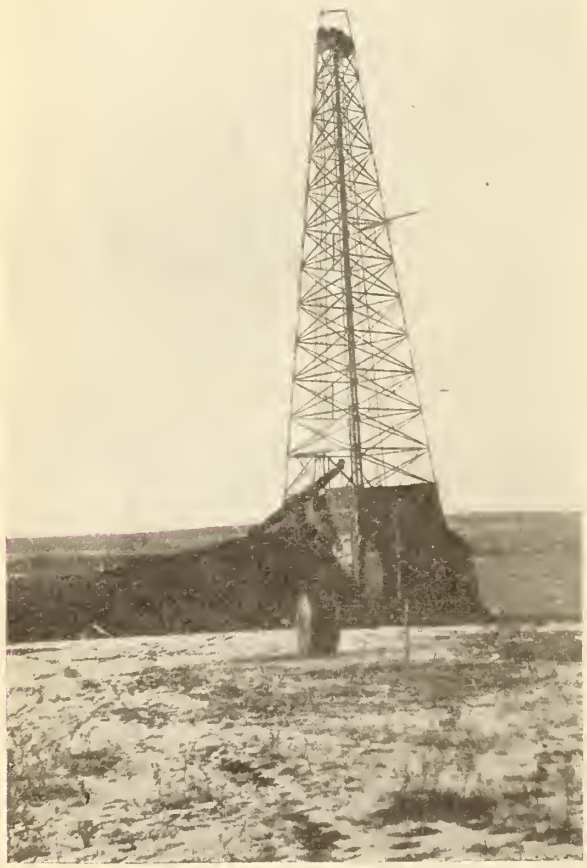


Fig. 1.—The well at Tit hills, near Czar, Alta. This well, the first drilled in Western Canada by Imperial Oil, has now reached a considerable depth.

Fig. 2.—Blairmore (Dakota) sandstone, practically vertical, at Mountain Mill, Alta. This is a good illustration of local disturbances in the Foothills area.

The drilling now in progress, or under consideration, should prove to be a fairly conclusive test. Work is being carried on at the following locations: In Saskatchewan, near the international boundary, south of Cypress hills; on the Saskatchewan river, north of Swift Current; at Muddy lake, southwest of Unity; in Alberta, south of Monitor in the Misty hills, and near Czar at Tit hills.

Apart altogether from the commercial aspect, the drilling of these wells will be of immense interest to geologists. Starting in the Bearpaw (Pierre) or the uppermost beds of the Belly river, they should, if carried to completion give a reliable and unique record of the Cretaceous sediments below these horizons and furnish interesting information regarding the attitude and character of the underlying Devonian.

Foot-hills Belt.

Although exploration in the foot-hills belt was also confined largely to rocks of Cretaceous age, the problems arising differed greatly from those of the plains. At the same time, the two areas have much in common, principally in the amount of attention that has been devoted to them by oil-men and geologists, and the abundance of literature that both have given to the public. Many prominent geologists have dealt with the various aspects of this area, and one need only turn to their reports to obtain an edifying account of their researches. The "oil-man" has also contributed a literature of his own, widely read and highly coloured, consisting of prospectus and share certificate, which, during the boom of 1914, enjoyed a short-lived popularity akin to that of a "best-seller." We may, therefore, be absolved from entering into any long-winded description of the geology of the foot-hills, taking it for granted that the subject is familiar to all.

The geologists of Imperial Oil set out on their mission well grounded in the general features of the territory. They knew that the Cretaceous rocks had been intensely folded and faulted in proximity to the

Rockies, and that, as one travelled eastward the effects of the great upheavals, complementary to mountain building, gradually diminished until the sedimentary rocks were eventually found in such an attitude as to give favourable structure for the accumulation of oil. Not only so, but rocks, recognized elsewhere as bituminous, were known to underlie the area within convenient reach of the drill.

Starting from the international boundary, they followed and mapped these outer folds into the Peace River district and traversed that river from above Hudson's Hope to 30 miles below Peace River Landing, the development around the latter place giving this a special interest.

As in eastern Alberta, the activities of the geologists were directed mainly to those points which previous research, either by the scientist or by the driller, had brought into prominence.

We have already mentioned the Calgary "boom" which was marked by a great deal of rash speculation and misdirected "wild-catting." There were certain redeeming features, however, notably the development

Fig. 3—Typical exposure of the Gates sandstone on Peace River. The beds are almost horizontal, the dip being measured in feet per mile. The Gates sandstone belongs to the Benton

Fig. 4—Highly folded and contorted beds of St. John shale (equivalent to part of the Benton) in the central portion of the disturbed belt on the Athabasca river west of Edmonton, Alta.

of Western Canada's first producing oilfield in Turner valley, west of Okotoks. The vast amount of drilling that was undertaken by the various mushroom companies at this time neither proved nor condemned southwestern Alberta as an oil-producer. Most of the wells were located at the whim of the driller and without any regard to geological conditions, whilst those which might have given a fair test were abandoned, owing either to drilling troubles or to lack of funds. The bursting of the bubble left the field discredited to a certain extent in the eyes of

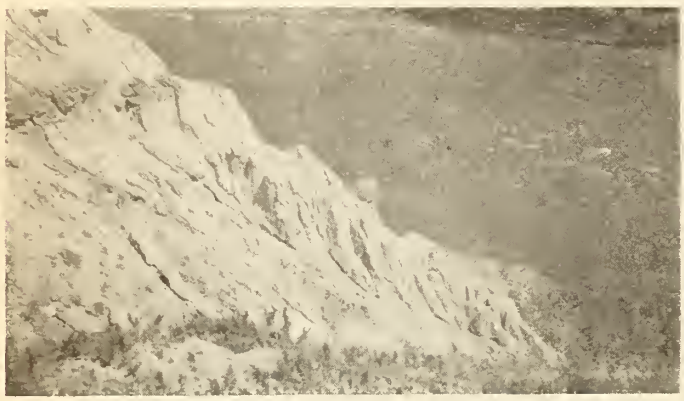


Fig. 5—Belly River sandstone on Waterton river near Pine creek, Alta. This exposure is on the eastern flank of the Twin Buttes anticline on which drilling is at present being done.

the public, but still interesting to the well-informed oil-man.

That Imperial Oil still have faith in the future of the area may be gathered from the fact that they have acquired scattered leases over a large area on representative structure, and are drilling, or preparing to drill, a series of wells that should prove an ample test of the foot-hills belt.

On a structure designated the Twin Buttes anticline, two wells are being drilled, one within a few miles of the international boundary and the other slightly to the north. On the Willow Creek anticline, west of Nanton, a third well is being drilled, whilst an endeavour will be made to deepen a well, taken over from another company, in the same territory. All these wells started in Benton shale and production would be looked for in the Dakota, although sandy places of the Benton might give 'shows' of oil.

Thanks to the enlightened policy of the government in throwing open the forest reserves to oil investigation, other promising areas have been made available and will probably be tested in the vicinity of Coalspur. Here the structure exposes Belly River strata with very steep dips, and gas seepages have been noted. Deep drilling will probably be necessary, but the chances of obtaining production from the Benton, or even from the lower beds of the Belly River, are not to be overlooked.

Favourable indications for oil are found near Pouce Coupe, the rocks at the surface being probably equivalent to the Lower Pierre of eastern Alberta. A test will, in all probability, be made there.

Regarding the present field of activity at Peace River, nothing need be said in addition to the reports of the government geologists, and the people interested. Success, if it does come, will probably be attained in the Devonian, the Cretaceous rocks having been drilled into, and through, without exceptional results.

There are other structures in the vast area under review that offer possibilities of oil and gas production. It is hoped that other companies will be sufficiently impressed with their possibilities to test them, so that in the near future we may know whether this area is destined to become a producer of oil or not.

Mackenzie River Basin.

Exploration of the basin of the Mackenzie dates back to the latter part of the eighteenth century, since

Fig. 6—Upper part of Smoky River shale (probably equivalent to Lower Pierre) along a tributary of Muskeg river, on the east flank of the outer anticline.

which time periodic attempts, more or less successful, have been made to traverse its fastnesses and collect information regarding its extent, physical features, and mineral wealth. The full story of these adventures is written in the pages of Canadian history and the illustrious names of those early *voyageurs* are perpetuated in memorials not made by hands. Needless to say the geologist was well in evidence and such names as Dawson, McConnell, Bell, Tyrrell, Dowling, Camsell and Kindle, to mention only a few, are closely connected with the activities of the pioneers.

The first investigation of the area on behalf of the petroleum industry, however, was not undertaken until 1914, when Dr. T. O. Bosworth, latterly chief geologist of Imperial Oil, Ltd., covered the whole

Fig. 8—Oil pool near the well at Windy point on Great Slave lake.

Fig. 7—An exposure of Tar sands on the Athabaska river, near McKay.

district "from the cities of Alberta to the Arctic Ocean." On his return to civilization he wrote "The expedition in Northern Canada has been entirely successful and findings of great importance have been made," a view amply borne out by current events.

Although the war intervened to hold up development, the project was naturally not lost sight of, and in 1919 two rigs were shipped into the country to locations previously made by Dr. Bosworth, one at Windy point on Great Slave lake and the other, destined to become famous, at a point 40 miles downstream from Fort Norman on the Mackenzie. Along with the drilling crews were two parties of geologists who devoted the short season at their disposal to a more careful study of the rocks in the vicinity of the drilling operations.

Both drilling and survey work were continued during 1920, the former coming to a rather successful conclusion in August, and the geologists finding themselves merely on the verge of great areas demanding careful study and painstaking work before their geological history can be written.

The Tar Sands.

In travelling northward on the great waterways, the Devonian formation is first found at Crooked rapids on the Athabaska. Associated with these limestones are "tar sands" regarding which a word may be permissible.

The natural oil indications along the Athabaska river are probably the most extensive and conspicuous in the whole world. For a distance of 100 miles a bed of tar sand from 150 to 220 feet in thickness, is almost continuously exposed along the sides of a gorge-like valley, and in many parts cliffs of the tar rock rise steeply from the water's edge to a height of 200 feet. From the exposures on the Athabaska and its tributaries, and by deduction, we may reasonably assume the existence of the tar sands over an area of 10,000 square miles, probably the largest deposit of asphaltum in the world.

The tar sand is a sandstone formation saturated with a dark viscous oil. Originally the rock must have been an ordinary bed of current-bedded sandstone, with some shaly courses, and plant-bearing in places. Courses of finer sandstone or sandy-clay rock, seams of lignite and thin lenticular seams of concretionary limestone are occasionally found, while, at the

Fig. 9—Blocks of dolomite from Windy bay at landing, Windy point, Great Slave lake.

base, there are sometimes ferruginous pebbly beds with little oil.

As seen at the outcrops, it is a black or dark-brown rock containing from 10 to 30 per cent (by volume) of heavy oil; it is soft and somewhat plastic and, in some instances, oil can be squeezed out by hand. In places, heavy, tarry oil issues slowly from the cliffs and accumulates in holes dug in the outcrop. Chemical analyses show this oil to be of fairly good grade, the chief trouble at present being that it is so viscous that it cannot be pumped from the wells.

It has been supposed that the asphaltic material seen at the outcrops of the tar sand is the residue from a vast body of oil from which the light constituents have evaporated. This assumption has led to the drilling of a number of wells back from the outcrop of the sand, with the hope of finding a lighter grade of oil. These hopes have not been realized, however, as the oil found was almost as viscous as at the outcrop of the sand.

Fig. 11—Highly bituminous Hope shales, the producing horizon of the well at Fort Norman. This photograph was taken at Old Fort Good Hope, where these beds are well exposed.

It seems possible that, eventually, an oil industry may be established in the Athabaska tar sand region, but whether this will be the result of totally unique methods of extracting the oil from the wells to circumvent its high viscosity or whether the chemist will devise a means of extracting the oil from the sands by retorting, will only be demonstrated by the march of events.

Slave Lake.

Nothing need be said of the geology along the waterways until we come to Slave lake. Travelling eastward from Fort Providence along the shores of that lake, no solid rock is found until after passing Slavie point. On the east side of this is a deep bay about five miles wide, having a beach formed of limestone fragments which have been derived from outcrops under the water near at hand. Crossing the bay we reach point Brule, where the land stands at a higher level. A raised beach, or really a succession of raised beaches, of limestone debris, occurs at this place and is traceable eastward for some miles.

At point Brule the waves of the present lake have cut into the older shore line, forming a cliff about 18 feet high, capped by loose stones. The lower part of the cliff is composed of fine grey limestone, fissile in parts, smelling strongly of petroleum and containing ill-preserved corals, alveolites, brachiopods, and gasteropods. The same rocks are exposed beneath the water.

At Windy point there are heavy beaches, old and new, consisting of limestone fragments (all more or less petroliferous) but the solid rock is not exposed. About 1½ miles from Windy point, however, the solid limestone is again seen beneath the water and then for two miles further the only evidence is in the beaches.

We now reach a portion of the shore where for three miles the solid rocks are conspicuous, forming a ragged coast-line with scars of limestone reaching far out into the water. The beds are still dipping in the same direction but the rock consists of a rough bedded dolomite-limestone of crystalline structure and porous texture, saturated with fluid petroleum which is seeping into the waters of the lake, giving rise to a distinct film of oil on the surface at most parts of the shore for several miles.

Where met with inland, for a distance of half a mile, the rock exposures contain small pools of asphalt and oil. Gas seepages have been noticed on the shore and small sulphur springs exist.

There is no evidence of structures, and the thickness of the beds is unknown. They have been referred to the middle Devonian and denominated "Slave Point limestone" and "Presqu'ile dolomite" respectively, and would probably correlate with the

Beavertail and Ramparts limestone of the Mackenzie.

In the valley of the Hay river, Cretaceous beds, approximately of the same age as the Loon River shales, are found, and also members of the upper Devonian correlated with the Chemung and Portage.

The well now being drilled at Windy point should give some interesting data regarding the thickness and character of the underlying strata.

Mackenzie River.

Stratigraphy.—The rocks of that part of the Mackenzie basin to which special attention is now being drawn range in age from Silurian to Tertiary, with a varying cover of Glacial and Recent material. As the Silurian does not enter largely into the present developments it may be dismissed in a few words.

In "The Mackenzie River Basin", by Camsell and Malcolm of the Geological Survey, reference is made to the "Palaeozoic, not sub-divided", which is found in

Fig. 12—Cretaceous deposits on Little Bear river, near Fort Norman. An 8 foot seam of coal is exposed at the base.

a range of mountains crossing Great Bear river at the rapids and extending northwest and southeast beyond the range of vision. Mount Charles, in this range, is said to consist of interstratified conglomerates, quartzites, and magnesian limestones of Palaeozoic age.

The interpretation given to these beds by our geologists is as follows, commencing with the lowest exposures:

Fig. 10—Unloading the boiler at Windy point, Great Slave lake.

	Feet.
Thin-bedded, black, hard, brittle limestone, with bituminous odour when freshly fractured	50
Pure white gypsum with lenses of bituminous shales	50
Highly cavernous, soft, brownish-red dolomite	150
Sandy, grayish limestone with fragments of chert, grading into a heavy, gray, fossiliferous limestone brownish and red in places	1,000
Red and brownish, brecciated, siliceous limestone with much chert. Red colour due to hematite	400
Grayish, brecciated, siliceous and cherty limestone	300
Break in evidence—	
Thick series of thin-bedded, sandy, grayish and buff limestone, becoming more massive and thick bedded near base. No fossils	1,800
White, very hard, almost quartzitic, marblelike limestone	100-200
Sandy, buff limestone and reddish-weathering sandstone	40-60
Extremely hard, pure white, thin-bedded limestone	50-60

Most of this section would approximate to rocks of Niagaran age, the three last mentioned beds, however, are included in what we have termed the "Bear Mountain series," the upper part of which may be Helderborgian and the lower part Monroe. In view of the controversy regarding the interpretation of the upper contact of the Silurian, we must hesitate to fix any definite horizon, leaving it to future, and more detailed, investigation.

These sections were obtained in the Franklin mountains, east of Fort Norman and in the Bear Mountain range which parallels the Mackenzie below its confluence with the Great Bear river.

As in the Silurian so in the Devonian much has still to be done before a complete table of its constituent parts, and anything approaching definite correlation, can be attempted. Neither is it certain that the nomenclature adopted by our geologists will be permanently associated with the beds to which they have been referred. What has been accomplished must

Fig. 13—Unloading the scows at Oil creek in 1919.

only be considered as preliminary investigation into a very interesting and complex problem, and due allowance made for the hurried nature of the survey.

The "Bear Mountain series" is composed of the following beds:

	Feet.
White, very hard, almost quartzitic, marblelike limestone	100-200
Sandy, buff limestone and reddish-weathering sandstone	40-60
Extremely hard, pure white, thin-bedded limestone	50-60
Massive, buff, shaly, cavernous and brecciated dolomite with indistinct bedding	200-225

As previously stated the greater part of this series has been interpreted as Silurian, the line of demarcation between that system and the Devonian being doubtful.

The "Lower Ramparts shale and limestone" is next in order, consisting of:

	Feet.
Hard limestone with olive green colour and bituminous odour	300 + —
Gray-green arenaceous shales, grading into a shaly limestone above. Thin calcereous seams contain chonetes	250 +

These are correlated as Oriskany and Onondaga.

The succeeding beds are termed "Ramparts limestone" and described as:

	Feet.
Compact gray limestone, well bedded into three or four main courses. Fossiliferous	100-300

By reason of the fossil evidence this is considered as being equivalent to the Hamilton.

The "Beavertail limestone" follows:

	Feet.
Dark, bituminous limestone, thin-bedded and in part largely made up of alveolites. Brachiopods in lower part	300-400

Being fairly hard, this limestone forms some rock features and is well exposed in places. It is highly bituminous and smells very strongly, especially when freshly fractured. It weathers to a dark colour and where it passes under water bubbles of gas arise. It has been correlated with the Tully of the Eastern States.

Perhaps the most important member of the series occurs next, namely, the "Hope shales" which have been classed with the Gennesse-Portage series.

	Feet.
Black, bituminous and carbonaceous shales. Plant remains in upper half. Rhynchonella in calcereous seams in lower. Concretions and thin beds of hard sandstone abundant	800-1,000

The shales smell strongly of bitumen, especially when freshly broken. The odour is perceptible from afar off. Where exposed they are undergoing slow combustion to such a degree that even the loose talus fallen from the banks is uncomfortably warm. In some places where these rocks pass under water, gas is bubbling up, and small flames arise from pieces of the rock placed in a log fire. On cooling these pieces turn red.

The shales are well exposed in many places, sections of from 75-200 feet being observed, often burnt to a bright brick-red colour from top to bottom. The upper part of the shales contains fossil plants, sigillaria, lepidodendron (?) and calamites. At intervals there are thin seams and lenticles of hard concretionary bituminous limestone. In the lower part there are some seams of calcareous shales containing rhynchonella in abundance.

On testing samples of this shale, which is the source of the largest show of oil in the Fort Norman well, a yield corresponding to 2½ gallons of oil per ton was obtained. In conjunction with the underlying limestone, we have here a remarkable series of bituminous rocks, of such a character as to form an admirable oil-generating formation.

Above the shales just described, we have the "Norman series," the lower part correlated with the Chemung and the upper with the Catskill. This series has been subdivided as follows:

	Feet.
Lower Norman sandstone (inconstant)—	
Bluish-green, poorly indurated flaggy sandstone, massive in places and jointed	0-300
Lower Norman shales—	
Dark blue plastic shales	250
Norman limestone (inconstant)—	
Thin-bedded, hard, argillaceous, impure grayish limestone	0-50
Upper Norman shales—	
Dark blue, soft, plastic shales with thin sandstone members	1,200
Upper Norman sandstone—	
Bluish-green, thin bedded to massive sandstone	300

Slight evidence was also found of a possible third sandstone member but this could not be substantiated.

The sandstones of this series, though rather fine, are soft and very porous, and are indeed excellent oil sands. Generally the rock is heavily charged with oil and for several miles along the river quite a considerable quantity of oil is seeping out from it. On following one of the creeks for a distance of 18 miles, several hundred feet of strata containing these green oil sands was passed over, and beneath them, in due course the bituminous shales and limestones were found.

The "Norman series" was considered to be the highest representative of the Devonian found in the area, the data given being based on the examination of sections between Fort Norman and Old Fort Good Hope.

In this region the Devonian, which throughout a great portion of the country lies nearly horizontal, has been thrown into a succession of strong folds. These are exceptionally well displayed, as the denudation has proceeded to just such a degree that the arches in the hardest limestone series stand out as mountains of from 1,000 to 2,000 feet in height. Between the antielines, the hard beds sink beneath the surface in troughs or synclines which are generally areas of low relief as the overlying shales are not capable of forming rock features.

The main folding of the Devonian took place in Pre-Cretaceous times, and after the folding, there occurred a period of denudation in which the land surface was carved into mountains with valleys between. Subsequently the Cretaceous deposits have been laid down in these lowlands around the mountains by seas and lakes, but the mountains themselves were probably not submerged. Later there has been some further slight folding, probably along the old axes, by which the Cretaceous and Tertiary beds are disturbed from the horizontal.

In still later times the great ice-sheet passed over the land and "plastered" it with deposits of boulder-clay, sands and gravels. Thus between the mountains there is a lack of evidence regarding the Devonian formation, the ground being occupied by forest, muskeg, boulder-clay or deposits of Cretaceous and of Tertiary age. The Cretaceous beds present are supposed to correlate with the Benton of Alberta and consist of:

Fig. 15—The well at Oil creek before it became famous. The "stadia" canoe in the foreground was used by the company's surveyors.

	Feet.
Black plastic shales with many sandstone members and concretions	100-800

They are found in the Franklin mountains and on both sides of the river for a considerable distance down stream, occupying the extreme flanks and troughs of the limestone structures.

Tertiary sediments are met with around Fort Norman, where, resting unconformably on the Cretaceous they occupy a basin of considerable extent. They are said to consist of:

	Feet.
Grayish and light sandstone with many large concretions; conglomeratic in places. Beds of lignite, plants and shells	100

The Glacial and Recent deposits have already been referred to. They consist of Glacial till with boulders, sands and river deposits of varying thickness, and are widely distributed over the area, only the higher mountains remaining uncovered.

Petroleum.

The evidences of petroleum are many and widespread throughout the region, and consist of bituminous rocks, burnt shales, pools of asphalt and seepages of gas and oil. It was considered that ample justification was forthcoming for the assumption that an oil-field of respectable dimensions awaited the drill, the reasons annexed being:

(1) The presence of strata capable of generating oil.

(2) The presence, above this, of porous strata capable of holding the oil.

(3) Geological structure such as to facilitate the concentration of the oil.

(4) Surface indications of gas, oil, and bitumen.

One word of caution may be added, however, to allay any excessive spirit of optimism regarding the area. It is well known in oil geology that oil is usually found in anticlines or up folds of the rocks. Such folds are found in the Mackenzie basin, but most, if not all of these so far found, have been eroded down to, or below, the Hope shales, which appear to be the source of the oil. In other words the crests of the folds on which the big production would be expected, have been eroded and the pools of oil which

Fig. 14—Hauling the boiler into place at Oil Creek.

Fig. 16—Winter quarters at Oil [illegible]

doubtless existed here in Pre-Cretaceous time have been, to a large extent, lost. Only the flanks of the folds remain for exploration.

The first test-well in the Mackenzie basin was located on the delta of "Oil creek" about 40 miles below Fort Norman, and drilling commenced in the late summer of 1919. At this point the presumed oil sands are near the surface and the well was designed to furnish information concerning the nature, thickness, and lower limits of the oil-bearing strata, no great production being expected. The record of the well, which was started in the Lower Norman sandstone, shows indications of oil from 80 feet downward throughout the remainder of the Norman series and

Fig. 17—The garden at Oil creek, where potatoes, peas, lettuce, radishes, turnips, carrots, etc., were successfully grown.

the underlying beds. As the depth increased the showings grew larger, until finally a flowing well was encountered at 783 feet in the Hope shales. After flowing for 30 minutes the well was successfully capped. Since there were no facilities by which the flow could be measured, definite figures are not available.

The importance of the strike is largely discounted by certain authorities because of the fact that the production was obtained in shale and not in sandstone. It should be noted, however, that besides getting production in the shale, the well proved the overlying sandstones to be oil-bearing to a certain extent, and justified the further development of the area with a view to testing their capabilities as commercial producers. Until this is done, we must exercise caution in dogmatizing regarding the ultimate issue.

Development.

Perhaps a word is necessary regarding the vexed question of the transportation of the crude oil from the field to the refinery, wherever situated. This aspect of the case has been widely discussed, and

Fig. 19—Striking oil. The well was begun with a 10-in. and finished with a 6-in. casing. On striking the deposit, the oil flowed for thirty minutes out of the 6-in. casing; after the flow had subsided the well was capped and a 2-in. "choker" and valve put in. The photograph shows the oil gushing out of the 2-in. pipe. It is of about 38 degrees Baume and is rich in light products.

practically every known means of transportation suggested, with the possible exception of the submarine.

It is, of course, perfectly clear to anyone who gives the subject more than superficial attention, that no company or individual producer will ever dream of

organizing any seheme of transportation before the resourees of the field have been thoroughly tested, and an idea obtained of the ultimate produetion. To do otherwise would be foolish in the extreme.

The difficulties and dangers of travel in these northern regions have been fully experienced by our drilling and geological parties during the past years. Their tales of shooting the rapids, storms on the lakes, hardships and delays at the portage, mosquitoes, and the long Arctic night, would not disgrace the pages of Fenimore Cooper, except that the 'noble red man' has now forsaken his tomahawk for a more highly commercialized form of 'scalping.'

That the initial produeer in this new field is 1470 miles from Edmonton, the nearest eity, 1,170 miles from MeMurray or 1,430 miles from Peace River, the nearest railway points, that insuperable barriers to continuous river travel are encountered in the rapids at Fort Smith and Vermilion, that the open season on the lakes is limited to 3½ months and on the rivers to six months, that labour is searee and expensive, and the country, as yet, ineapable of supplying suffieient food for its present population, are all factors whieh must be faced and overcome in any scheme for the development of the area.

Those whose interests are, or may be, conneeted with the solution of these problems can safely be left to deal with each difficulty as it arises and every need as it becomes clamant, and, should these northern territories eventually become one of the world's oilfields, there is no doubt but that their product will find a way, however devious, to the market.

Fig. 18—Timber on Bear Island, where the company's No. 2 well is located. The log cabin may be seen in course of construction in the background.

Fig. 20—Shooting the rapids at Smith with an empty scow. According to the pilot these particular rapids had never before been 'shot'.

PERSONALS

James Cumberford, of Amherst, has been appointed general manager of the Maritime Coal, Railway & Power Co. of Joggins Mines, succeeding R. J. Bell. Mr Cumberland was born in Scotland, and his mining experience includes work in South America. N. T. Avard, for twelve years accountant and secretary-treasurer of the Maritime Company, is appointed assistant manager. Mr Bell has been general manager for eight years, and during his term of management he has very successfully developed a difficult property.

Mr. J. E. Hammell has returned to Toronto after making a trip to Prince Albert and Winnipeg in connection with negotiations concerning the Elbe Flow property of which Mr. Hammell and his associates are the chief owners.

Mr. W. A. Carlyle, formerly managing director of British America Nickel Corporation, is in France.

Mr. J. B. Tyrrell, who recently returned from a trip to Alberta, is now visiting mines in Ontario in company with Mr. Frechville of London.

Mr. R. E. Hore, of Toronto, is compiling a book on mining companies operating in Ontario.

Northern Ontario Letter

THE SILVER MINES.

The Cobalt District.

The price of silver has shown renewed strength during the past week. The quotations for the metal have become the barometer which, more than ever before in the history of silver mining in Cobalt, is to regulate the extent of work. So close is the margin between profit and loss that a slump in price threatens the welfare of operating mines, while a rise in quotations holds out promise of the closed-down properties being able to operate.

The directors of the Nipissing Mining Company announce that the dividend for the second quarter of 1921 will be 3 p.c., instead of the usual 5 p.c. This reduction is due to a decline in net profits realized during the first quarter of the year. In recent years, the Nipissing has paid dividends at the rate of 5 p.c. quarterly, plus two bonuses of 5 p.c. each, making up a total of 30 p.c. a year. Just how long the reduced rate of 12 p.c. will be continued will probably be determined by the price which silver is to command on the markets. The company has a surplus of close to four million dollars, but is apparently desirous of preserving this for the time being.

A fire during the past week broke out in the shafthouse of the Nipissing at its Meyers shaft, and completely wrecked the structure. A large quantity of the better grade ore being treated by the Nipissing has been coming from this shaft, and until the shafthouse is replaced by a new one, the production figures may be under normal.

Concerning the Chambers-Ferland mine of the Aladdin-Cobalt Company, which has now come under the control of the Kirkland Lake Proprietary (1919) Ltd., some detailed information has been received by the correspondent of the Journal. H. G. Latilla and Conrad E. Jorgenson, who recently visited the property, and returned to England last month, have issued a statement in which this information is offered:

"This property (the Aladdin-Cobalt) immediately adjoins the famous and highly successful Nipissing Company's Mine; for some time past that company has been carrying on extensive development work right on your boundary — and at recent dates have in three cases followed rich silver veins into your ground. They are very good neighbours and at all times have assisted as in every way possible.

"The position to-day is most interesting as the veins in the three cases referred to are on the fringe of an important tract of undeveloped ground owned by your company, situated in the very heart of Cobalt.

"To make matters clear — In one place the Nipissing Company has broken a quantity of valuable ore within our boundary, the silver value of which it is not yet possible to estimate. At another place it has entered a portion of our ground estimated to contain 175,000 ounces of silver. In both these cases we have arranged with the Nipissing Company to raise and mill the ore, charging us only exact cost—their costs being the lowest on the field. This work is now progressing.

Concerning the foregoing, enquiry at the mine office of the company goes to show that further favorable results have occurred since the above statement was made. Charles Richardson, resident manager of the mine informed the "Journal" that the company is now shipping about 25 tons of ore daily to the Bailey Customs Mill, in addition to bagging a substantial amount of high-grade ore.

Nothing official has so far been secured as regards the likelihood of the Mining Corporation resuming work. Unofficial reports have been in circulation to the effect that the mine would be re-opened some time in May. This company is receiving a good deal of publicity on the strength of it having been identified with the syndicate which recently dropped an option on the Flin-Flon property in Northern Manitoba. It has since been reported that the Mining Corporation, together with certain English interests, has opened negotiations with a view to securing a new option. At the time of writing, it is officially stated the deal has not actually been completed. Incidentally, it is announced from Winnipeg that the Provincial Government of Manitoba is willing to construct a railway to the mine provided the holders of the option will advance a million dollar bond as a mark of good faith.

The report of the Manager of the Nipissing Mining Co for March is as follows:

"During the month of March the Company mined ore of an estimated net value of $156.775 and shipped bullion from Nipissing and custom ores of an estimated net value of $336.584. The value of the silver produced was estimated at 56-7/8 cents per ounce.

There were no underground developments of unusual interest during the month. The Low-Grade Mill treated 7,330 tons. The High-Grade Plant treated 90 tons. The Refinery shipped 592,518 fine ounces of bullion."

Arthur A. Cole, mining engineer for the T. & N. O. Ry., submits the following statement of ore shipped over the railway from Cobalt during March:

ORE STATEMENT.

(In tons of 2,000 lbs.)

SILVER ORE.

Cobalt Proper	Tons
1. Bailey Silver Mines	25.41
2. Coniagas	65.48
3. LaRose	122.46
4. O'Brien	32.00

The above shipments were made to the following companies:

CANADA

Delora Smelting & Refining Co., Delora	32.00
Coniagas Reduction Co., Thorold	180.37

UNITED STATES.

Pennsylvania Smelting Co., Carnegie	32.98
	245.35

PRICE OF SILVER.

Mar. 22nd.	58.750
Mar. 5th.	52.625
Average	56.023

Elk Lake and Gowganda.

Not more than 100 men are engaged in the Gowganda district, although this Spring promises to witness a moderate increase in the scope of work. At the time of writing about 75 men are employed altogether at the Miller Lake-O'Brien and the Castle. A number of other small operations are either started or will soon be working, among them being the Powerful, Thompson Gowganda, Silverado, Gowganda Enterprise, etc.

Gowganda is paying a heavy price for not having been given railway transportation facilities. Despite the fact that the Miller Lake O'Brien developed one of the richest silver-veins in the world, and in spite of many

hundreds of promising veins in which silver occurs in encouraging quantities, the cost of working property in the Gowganda field has proved to be a burden which has prevented even a moderate degree of success. As pointed out at the recent annual meeting of the Canadian Institute of Mining and Metallurgy, by W. E. Simpson, the question of transportation is one of the problem which must be solved if mining progress is to continue. Mr. Simpson pointed out that the cost of working a mine is added to the extent of one dollar a ton on all the ore treated, for each mile a mine may be removed from railway transportation. Provided this works out, it is obvious, therefore, that the wagon-haul of 27 miles from the railhead to Gowganda has added at the rate of $27 to the cost of treating each ton of ore taken out. The burden is something which not even the richest mines could carry for any very great length of time. And, the present slump in connection with work in the Gowganda district is due more to the lack of good transportation than to lack of merit in the mineral possibilities of the area.

South Lorrain.

High-grade ore has recently been encountered on the Haileybury Frontier property, and a substantial quantity has been bagged ready for shipment. The property was originally opened up for the purpose of taking out Cobalt metal, and with the expectation of recovering low silver values as a by-product. Those who control the enterprise, also control the Haileybury Silver and are making a bid for the Forneri property.

Captain D. Stairs, manager of the Keeley Silver Mines has arrived at the property, and this mine will join the producing list at as early a date as possible to get underground work under way and preparations completed to send ore to the 20-stamp mill which was installed last summer and fall.

During the week ended April 15th, the La Rose Consolidated was the only company to ship ore from Cobalt, this company sending out two carloads weighing approximately 125,886 pounds.

During the corresponding period the Nipissing continued to send out silver bullion, and on April 11th sent out 77 bars containing 100,511.29 fine ounces.

THE GOLD MINES.

The Porcupine District.

Big achievements are marking the activities at the leading gold mines of the Porcupine district. During the past two weeks or so, the Hollinger Consolidated has increased its production by nearly 100 p.c. This big increase, together with the headway being made at the Dome and the McIntyre, has created general enthusiasm.

An unexpected incident of the week is the decision of the directors of the Porcupine V. N. T. Mines to defer for a further period the date of re-opening the mine and mill. This decision was reached in the belief that economic conditions will still further readjust themselves to the advantage of gold mining. While this decision is regarded as being the better part of wisdom, yet it is contrary to what had been anticipated by those shareholders who have been waiting patiently, or impatiently as the case may be, for the mine to resume work. It has been pointed out officially, however, that the Porcupine V. N. T. is in a strong physical condition, and that its favorable situation in relation to labor supply, railway transportation and hydro electric power may be considered excellent. It is reported this week, that certain mining interests said to be identified with the Hollinger Consolidated have made a bid of 10 cents a share for the control of the Porcupine V. N. T., but it is understood the offer has been rejected. It is intimated that 10 cents a share would be acceptable for stock remaining in the Company's treasury, but the present control would not be willing to relinquish control at that figure.

It has been decided to erect about 130 new houses in Timmins, the location chosen being on the plains to the west of the town. Contracts have already been let, and the work will proceed as rapidly as possible. It was recently stated the present ball-grounds might be used for the purpose, and a new field for sports established somewhere else, but this plan has been abandoned for the time being. The new dwellings are being put up by the Hollinger for the accommodation of its employees.

A number of new mining operations are being planned at Porcupine, and a number of more or less important deals are pending. Among these may be mentioned the Goldale Mining Company which is taking over a large acreage of mining land formerly held by the Bewick-Moreing interests.

Mining Inspector J. C. MacMillan, expressed the belief to your correspondent that the gold mines would reap great benefit from the fact that the new men being added to their forces have had previous mining experience. The silver mines have laid off approximately 1,200 men within the past year, while the nickel mines of Sudbury have also laid off many hundreds of men. These workers, or a large part of them, are available for the gold mines which are now speeding up to full capacity. The benefit of being able to engage full forces would in itself be important, but is made doubly so when these full forces are made up of experienced miners.

Kirkland Lake District.

Official advice to the "Journal" confirms earlier rumors that the Tough Oakes Gold Mines will resume work immediately. In a detailed report, Messrs. Latilla and Jorgenson, of London, England, who recently visited the properties, state that work will commence about the end of April, and development will be carried on aggressively. By the end of August it is believed the development work will have placed sufficient ore in sight to warrant a re-opening of the mill, at which time this mine will join the producing list and will treat from 110 to 140 tons of ore daily.

It is reported unofficially that negotiations have been opened between the Ontario Kirkland Gold Mines and the Hunton-Kirkland, in which the first named company is making a bid to secure control of the company. No details have been secured. In the meantime, the Ontario Kirkland has commenced the construction of a new mill which is designed to treat 100 tons of ore daily.

According to information by mail, a special general meeting of stockholders of the Miller Independence Mines, Ltd., was held on Saturday, last, at the Phillips Hotel, Dayton, Ohio, Mr. Wm. Stroop, president of the company, occupying the chair.

To comply with the legal formalities in determining whether a quorum was present, a poll was taken prior to the opening of the meeting and it was found that out of a total of 577,000 shares issued, more than 116,000 were then represented directly or by proxy, which number was considerably increased by later arrivals, all of which indicates the personal interest being taken in the progress of the enterprise.

The object of the meeting was to discuss means for financing the company by the sale of treasury stock, or through other channels, so that the company's Treasury could be kept well supplied with funds ahead of every other consideration.

Mr. John C. Schaeffer, secretary and treasurer, read the financial statement, and an active discussion ensued in which Judge O. B. Brown, Mr. Tomlinson, Dr. H. V. Dutrow and other stockholders took prominent part.

The general inclination was in favor of a "pooling" of all stock until such time as $50,000 could be obtained through the exclusive sale of treasury stock, and various means were suggested of collecting all existing stock issued, either through re-naming the company, re-capitalization, or by adopting some method of re-organization.

The additional cash now required is for an extensive campaign of diamond drilling, the appliances and crew for which are all ready to start, and for the installation of a small test mill for treating ore extracted during development by the preliminary treatment process of crushing, concentrating and amalgamation.

A committee of five representative stockholders was appointed to co-operate with the directors in an advisory capacity and to report to a further general meeting of stockholders to be held on the 23rd of April, which would be considered as an adjourned meeting of the one just held. The five stockholders of the advisory committee were selected to represent the interests of the districts in which they reside, two from Dayton and one each from Germantown, Springfield and Xenia, all in Ohio.

CANADIAN INSTITUTE OF MINING AND METALLURGY.

Secretary-Treasurer's Western Tour 1921.

The following itinerary will be followed as closely as circumstances will permit, and unless advised, by wire, to the contrary local secretaries may expect the Secretary-Treasurer on the dates specified. If it is desired to hold meetings at other points than Branch headquarters the Secretary-Treasurer should be advised in ample time.

Leave Toronto,	Tues.,	May	10th,	10.00 p.m.	
Arrive Calgary,	Fri.,	"	13th,	8.10 p.m.	
Stop Calgary,	Sat.,	"	14th,		(Rocky Mountain
	Sun.,	"	15th,		Branch)
	Mon.,	"	16th,		
Leave Calgary,	Mon.,	"	16th,	6.55 p.m.	
Arrive McLeod.	Mon.,	"	16th,	11.15 p.m.	
Leave McLeod.	Tues.,	"	17th,	5.05 a.m.	
Arrive Fernie,	Tues.,	"	17th,	9.55 a.m.	(Rocky
Stop Fernie,	Wed.,	"	18th,		Mountain Branch)
Leave Fernie,	Thurs.,	"	19th,	9.55 a.m.	
Arrive Nelson,	Thurs.,	"	19th,	8.30 p.m.	
Stop Nelson and Vicinity:					
	Fri.,	May	20th,		
	Sat.,	"	21st,		(Kootenay-Boundary
	Sun ,	"	22nd,		Branch)
	Mon.,	"	23rd,		
	Tues.,	"	24th,		
Leave Nelson,	Tues.,	"	24th,	9.05 p.m.	
Arrive Vancouver,	Thurs.,	"	26th	5.20 a.m.	
Stop Vancouver,	Thurs.,	"	26th,		
	Fri.,	"	27th,		(British Columbia)
Leave Vancouver,	Sat.,	"	28th,	Midnight.	
Arrive Victoria,	Sun.,	"	29th,	7.00 a.m.	
Stop Victoria,	Mon.,	"	30th,		
Leave Victoria,	Tues.,	"	31st,	8.45 a.m.	
Arrive Duncan,	Tues.,	"	31st,	10.55 a.m	
Stop Duncan & Vicinity:					
	Tues.,	"	31st,		
	Wed.,	June	1st,		
Leave Duncan,	Wed.,	"	1st,	5 30 p.m	
Arrive Nanaimo,	Wed.,	"	1st,	7.10 p.m.	
Stop Nanaimo,	Thurs.,	"	2nd.		
	Fri.,	"	3rd,		(Nanaimo Coal Section)
Leave Nanaimo,	Sun.,	"	5th,	8.00 a.m.	
Arrive Vancouver,	Sun.,	"	5th,	10.15 a.m.	
Leave Vancouver,	Mon.,	"	6th,	8.00 p.m.	S.S. Prince
Arrive Prince Rupert,	Wed.,	"	8th,	10.30 a.m.	[George.
Arrive Anyox,	Thurs.,	"	9th,	7.00 p.m.	
Stop Anyox,	Fri.,	"	10th,		
	Sat.,	"	11th,		(North Coast
Leave Anyox,	Mon ,	"	13th,	6.00 p.m.	S.S. Cheloh-
Arrive Prince Rupert,	Tues.,	"	14th,	8.00 a.m.	[sin.
Leave Prince Rupert,	Wed.,	"	15th,	11.15 a.m.	
Arrive Edmonton,	Fri.,	"	17th,	6.50 a.m.	
Stop Edmonton,	Sat.,	"	18th,		
	Sun.,	"	19th,		
Leave Edmonton,	Mon.,	"	20th,	9.30 p.m.	
Arrive North Battleford,	Tues.,	"	21st,	8.35 a.m.	
Leave North Battleford,	Wed.,	"	22nd,	5.00 a.m.	
Arrive Prince Albert,	Wed.,	"	22nd,	3.45 p.m.	
Leave Prince Albert,	Wed.,	"	22nd,	4.00 p.m	
Leave Prince Albert,	Wed.,	"	22nd,	4.00 p.m.	
Arrive Hudson Bay Junc.	"	"	"	10.50 p.m.	
Leave Hudson Bay Junc.	Thurs.,	"	23rd,	4.30 a.m.	
Arrive The Pas,	Thurs.,	"	23rd,	9.50 a.m.	
Stop The Pas,	Fri.,	"	24th,		
	Sun.,	"	26th.		
Leave The Pas,	Mon.,	"	27th,	5.00 p.m.	
Arrive Winnipeg,	Tues.,	"	28th,	4.00 p.m.	
Stop Winnipeg,	Wed.,	"	29th,		
	Thurs.,	"	30th,		
Leave Winnipeg,	Fri.,	July	1st,	5.00 p.m.	
Arrive Cochrane,	Sat.,	"	2nd,	8.25 p.m.	
Arrive Porquis Junc.,	Sat.,	"	2nd,	9.00 p.m.	

Last train for Porcupine leaves Porquis Junc. at 9.25 p.m. If this connection cannot be made, will stop Cochrane over Sunday, July 3rd, and

Leave Cochrane,	Mon.,	July	4th,	7.00 a.m.	
Arrive Porcupine,	Mon.,	"	4th,	9.26 a.m.	
Stop Porcupine and Vicinity					
	Tues.,	"	5th,		
	Wed.,	"	6th,		(Porcupine Branch)
	Thurs.,	"	7th,		
	Fri.,	"	8th,		
Leave Porcupine,	Sat.,	"	9th,	6.49 a.m.	
Arrive Swastika,	Sat.,	"	9th,	10.32 a.m.	
Stage to Kirkland Lake,					
Stop Kirkland Lake and Vicinity					
	Sun.,	July	10th,		
	Mon.,	"	11th,		
	Tues.,	"	12th,		
Leave Kirkland Lake,	Wed.,	"	13th.		via stage to Swastika.
Leave Swastika,	Wed.,	"	13th,	10.32 a.m.	
Arrive Cobalt,	Wed.,	"	13th,	1.35 p.m.	
	Fri.,	"	15th,		
Leave Cobalt,	Sat.,	"	16th,	6.14 p.m.	
Arrive Sudbury,	Sat.,	"	16th,	12.55 p.m.	
Stop Sudbury and Vicinity,					
	Sun.,	July	17th,		
	Mon.,	"	18th,		
	Tues.,	"	19th,		
	Wed.,	"	20th.		
	Thurs.,	"	21st,		
Leave Sudbury,	Fri.,	"	22nd,	11.55 a.m.	
Arrive Sault Ste. Marie,	Fri.,	"	22nd,	6.45 p.m.	
Stop Sault Ste. Marie,	Sat.,	"	23rd,		
	Sun.,	"	24th,		
Leave Sault Ste. Marie,	Sun.,	"	24th,	3.20 p.m.	
Arrive Toronto,	Mon.,	"	25th,	8.10 a.m.	

LIGNITE BRIQUETTES AT $11.50 PER TON.

The Attorney-General of Manitoba stated that in the Legislature on the 15th April that lignite briquettes from the plant at Bienfait, Saskatchewan, would be delivered in Winnipeg at an inclusive cost of $11.50 per ton. Seventy thousand dollars was included in the Manitoba estimates as that province's share towards the excess cost over estimates of the briquetting plant caused by rise in material costs. The Saskatchewan Government and the Dominion Government are jointly contributing towards the excess cost, as they have done toward the first expenditures.

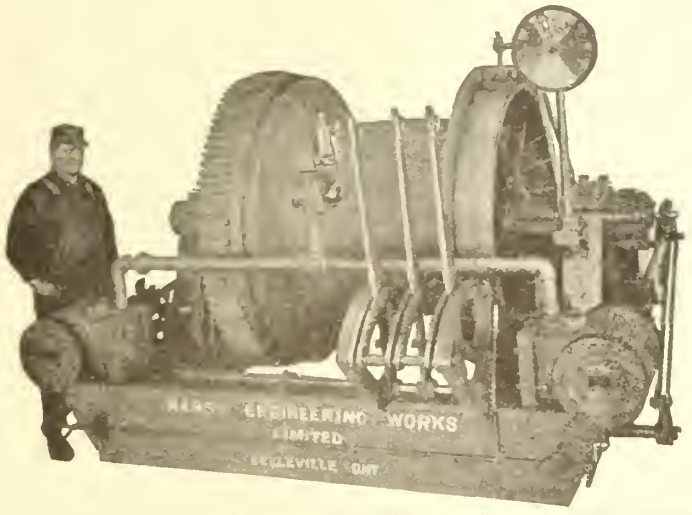
TYPE "F"
MARSH MINE HOIST
STEAM or ELECTRIC

STEAM POWER

The twin cylinders develope 55 Horse Power with a liberal allowance of 25 per cent friction loss.

The 40" Drum will lift 5100 lbs. at a speed of 360 feet per minute.

Shipping Wt., 20,000 lbs.



Friction Drive, 40" Dia. Drum, Reversing Links, Cast Steel Gears.

ELECTRIC POWER

Will take any size motor up to 100 Horse Power.

Using a 100 H. P. motor, the 40' Drum will lift 6000 lbs. at a speed of 550 feet per minute.

Shipping Wt., 17,700 lbs.

TYPE "F" MINE HOIST is the largest and most powerful Mine Hoist that we build at the present time. The large choice of drum diameters, as listed below, and the equally large choice of rope speeds makes this Hoist adaptable to most any depth now being worked in Canada.

All gears in these **TYPE "F" HOISTS** are made of the best grade Cast Steel, all parts proportioned to give the maximum strength without undue weight.

The Depth Dial is arranged to suit the depth of the mine where the hoist will be used.

These Hoists are made with either Friction Drive as shown, or with the Drum keyed fast to the shaft, so it cannot revolve in either direction except by power.

SPECIFICATIONS OF TYPE "F" MINE HOISTS
FRICTION DRIVE

STEAM POWER

Based on 100 lbs. Steam Pressure in the Boiler. If 125 lbs. pressure is used, add 25 per cent to the load lifted, the rope speed remaining the same.

Diam. of Drum	Length of Drum	Depth of Drum Flange	Weight Lifted in pounds	Rope Speed in feet	Estimated Shipping Weights	Telegraphic Code Words
24"	36"	18"	8000	226	18500	Bilker
30"	"	15"	7000	360	19000	Edelic
36"	"	12"	5600	325	19500	Edership
40"	"	10"	5000	360	20000	Efficient
48"	"	6"	4200	420	21000	Egelliad
54"	"	3"	3800	485	22000	Eklund

ELECTRIC POWER.

Based on the use of a Motor of 100 Horse Power rated capacity. If a smaller motor is used, the load lifted will be reduced in proportion, the rope speed remaining the same.

Diam. of Drum	Length of Drum	Depth of Drum Flange	Weight Lifted in pounds	Rope Speed in feet	Estimated Shipping Weights	Code Words Without Motor
24"	36"	18"	13750	240	16100	Mingow
30"	"	15"	8000	440	16300	Minhet
36"	"	12"	6600	500	17000	Mirror
40"	"	10"	6000	550	17500	Mizzen
48"	"	6"	5000	660	18400	Mohair
54"	"	3"	4460	710	19000	Mohawk

NOTE.—In the Electric Hoist we can readily reduce the Rope Speed to any desired figure thereby increasing the Weight Lifted in like proportion.

BUY IN CANADA. SAVE THE DUTY AND EXCHANGE.

Use a Canadian Made Hoist to Hoist Canadian Ores.

The Marsh Mine Hoists are all made in Canada and Guaranteed in Canada by a responsible Canadian Manufacturer of long standing.

Send for Special Mining Catalogue, also for Prices and Photos.

MARSH ENGINEERING WORKS, LIMITED Established 1846 **Belleville, Ontario.**

Sales Agents: MUSSENS LIMITED, Montreal, Toronto, Winnipeg and Vancouver

TORONTO MINING STOCK QUOTATIONS.

Quotations on Active Stocks on Standard Stock Exchange for April 20th.

	Ask	Bid
Silver		
Adanac Silver Mines, Ltd	1½	1
Bailey	3¼	2½
Beaver Consolidated	34	33
Chambers-Ferland	9	6
Coniagas	1.85	1.75
Gifford	1⅛	1
Great Northern	2½	1⅞
Hargraves	1¼	1¼
La Rose	24½	23½
McKin.-Dar.-Savage	20	12
Mining Corp. of Canada	1.00	.91
Nipissing	7.42	7.35
Peterson Lake	7	5½
Silver Leaf	2¼	1¼
Temiskaming	24½	24½
Trethewey	12½	12
Gold		
Apex	2½	2
Atlas	13	8
Dome Lake	4	4
Dome Mines	22¾	22.35
Gold Reef	3⅝	3½
Hollinger Consolidated	7.14	7.10
Hunton Kirland G. M.	11	8
Keora	15¾	15
Kirkland Lake	53	52
Lake Shore M. Ltd.	1.23	1.21
McIntyre	2.00	1.98
Newray Mines, Ltd.	6	5
Porcupine Crown	25	23½
Porcupine V. N. T.	20	19
Preston East Dome	3¾	3½
Skead	45	20
Schumacher	25	23
Teck-Hughes	15	14
West Dome	7½	7
West Tree Mines Ltd.	4½	3¾
Oils		
Rockwood Oil, Gas	3	3
Vacuum G.	8¾	7

MONTREAL METAL QUOTATIONS.

Following are fair average prices for ingot metals (in less than car-load lots) at Montreal:

	April 14	April 21
Copper, Electro	17	17
Copper, Casting	16¾	16¾
Tin	34	36
Lead	6	6¼
Zinc	7	7¼
Aluminum	34	34
Antimony	7¼	7¼

SUDBURY NOTES.

D. E. CUSHING.

A certain amount of work is being carried on at the Murray Mine of the B.A.N.C. while the future of the Corporation is being fought out by the leading financial interests.

It is pretty hard to see daylight at present and many local people interested in its success think that a less pretentious scheme of financing will have to be devised. The O'Brien interests lost and gained in their application to make permanent their injunction proceedings which tied-up the financial re-organization meeting. Mr. Justice Middleton dismissed the application but in doing so issued a warning that the O'Brien interests had cause and suggested some settlement. This led Mr. I. F. Hellmuth, Counsel for the Trust Company to declare that he would advise his clients that they go no further with the scheme.

And so matters stand, where the next step will come from or what the next move will be no one knows. There are reports that the big industry is gone but these bearish reports have no foundation in fact. There is too much capital tied-up and though the proposition has been a loser financially so far, it is no different than any other mine in this regard. It is the rare property that makes money while developing. The consensus is that money was spent on the property with rather a lavish hand, also that certain development work must be done to make for efficient mining and to ensure a continuous supply of ore for the smelter, and this with real efficient mining and good business administration, should, when markets for copper-nickel improve, make for a great and paying industry.

The International Nickel Company has turned loose another large body of men. Since the last curtailment, the men have only been working part time. This was to ensure all that they would have enough to live on. However with the advent of Spring, the older employees were put on full time and the surplus of younger men turned loose. There are many rumors about in regard to the Company. One is that there are to be important changes in organization and another that the latest curtailment is but a prelude to a complete shut down.

Certainly the International has a tremendous supply of nickel matte on hand for which the market at present is non-existent. Not long ago Mr. Agnew stated that he hoped the market would pick up in six months, but he pointed out that their main hope for a market was from the auto and steel industry and that these industries would have to go ahead first.

TORONTO NOTES.

Flin Flon Mine.

Reports from Winnipeg and Prince Albert indicate that a new deal regarding the Flin Flon mine has been arranged. The Toronto company which is reported to be one of the purchasers has not yet given out any statement concerning the truth of the reports and it will probably be some days before the results of the negotiations are known. Mr. J. E. Hammell is at present in ths West and is believed to be actively engaged in arranging a new deal.

According to the report from Winnipeg the syndicate which has secured an option for one year on the property includes the Mining Corporation of Canada and British interests represented by Mr. Eric C. Rose of London. The Mining Corporation was interested with W. B. Thompson and associates of New York in the option which expired April 1. A large sum was spent in developing the property last year and the results are understood to have been very good and confirmatory of the evidence previously obtained by diamond drilling. It would not be surprising if the report that

The Canadian Miners' Buying Directory.

Acetylene Gas:
Canada Carbide Company, Ltd.
Canadian Fairbanks-Morse.
Prest-O-Lite Co. of Canada, Ltd.

A.C. Units:
MacGovern & Co
Powley & Townsley, Limited.

Agitators:
The Dorr Co.

Air Compressors:
Sullivan Machinery Co.

Air Hoists:
Canadian Ingersoll-Rand Co., Ltd
Mussens, Limited.

Alloy and Carbon Tool Steel:
H. A. Drury Co., Ltd.
International High Speed Steel Co., Rockaway, N
Peacock Brothers Limited.

Alternators:
MacGovern & Co.

Spielman Agencies, Regd

Aluminium:

Amalgamators:
Northern Canada Supply Co.
Mine and Smelter Supply Co.
Wabi Iron Works.

Antimony:
Canada Metal Co.

Antimonial Lead:
Pennsylvania Smelting Co

Arrester, Locomotive Spark:
Hendrick Manufacturing Co.

Assayers' and Chemists' Supplies:
Dominion Engineering & Inspection Co
Lymans, Limited
Mine & Smelter Supply Co.
Pennsylvania Smelting Co.
Stanley, W. F. & Co., Ltd.

Ash Conveyors:
Canadian Link-Belt Company

Ashes Handling Machinery:
Canadian Mead-Morrison Co., Limited
Canadian Link-Belt Co., Ltd.

Assayers and Chemists:
Milton L. Hersey Co., Ltd.
Campbell & Deyell
Ledoux & Co.
Thos. Heys & Son
C. L. Constant Co.

Asbestos:
Everitt & Co.

Balls:
Canadian Foundries and Forgings, Ltd
Canadian Steel Foundries, Ltd.
Hull Iron & Steel Foundries, Ltd.
Fraser & Chalmers of Canada, Ltd
Peacock Brothers Limited.
The Electric Steel & Metals Co
The Wabi Iron Works.
The Hardinge Conical Mill Co

Ball Mills:
Hardinge Conical Mill Co.
Hull Iron & Steel Foundries, Ltd.
Mine and Smelter Supply Co.
Fraser & Chalmers of Canada, Ltd.
The Electric Steel & Metals Co.
The Wabi Iron Works.

Balances—Heusser:
Canadian Fairbanks-Morse Co., Ltd
Mine and Smelter Supply Co

Babbit Metals:
Canada Metal Co.
Canadian Fairbanks-Morse Co., Ltd
Hoyt Metal Co.

Ball Mill Feeders:
Fraser & Chalmers of Canada, Ltd
Hardinge Conical Mill Co
Hull Iron & Steel Foundries, Ltd

Ball Mill Linings:
Hardinge Conical Mill Co.
Hull Iron & Steel Foundries, Ltd

Belting—Leather, Rubber and Cotton:
Canadian Fairbanks-Morse Co., Ltd
Canadian Link-Belt Co., Ltd.
The Mine & Smelter Supply Co.
Northern Canada Supply Co.
Jones & Glasco.

Belting:
R. T. Gilman & Co
Gutta Percha & Rubber, Ltd

Belting—Silent Chain:
Canadian Link-Belt Co., Ltd
Hans Renold of Canada, Limited, Montreal, Que
Jones & Glasco (Regd)

Belting (Transmission):
Goodyear Tire & Rubber Co

Belting (Elevator):
Goodyear Tire & Rubber Co

Belting (Conveyor):
Goodyear Tire & Rubber Co.
Gutta Percha & Rubber, Ltd.

Blasting Batteries and Supplies:
Canadian Ingersoll-Rand Co., Ltd
Mussens, Ltd.
Northern Canada Supply Co.
Canadian Explosives, Ltd.
Giant Powder Co. of Canada, Ltd.
Powley & Townsley, Limited.

Bluestone:
The Consolidated Mining & Smelting Co.
The Coniagas Reduction Co., Ltd.

Blowers:
Canadian Fairbanks-Morse Co., Ltd
MacGovern & Co., Inc.
Northern Canada Supply Co.
Fraser & Chalmers of Canada, Ltd.

Boilers:
Northern Canada Supply Co.
Canadian Ingersoll-Rand Co., Ltd
Marsh Engineering Works
MacGovern & Co., Inc.
R. T. Gilman & Co.
Fraser & Chalmers of Canada, Ltd.
The John Inglis Company
Wabi Iron Works.

Blue Vitriol (Coniagas Red):
Canadian Fairbanks-Morse Co., Ltd.

Bortz and Carbons:
Diamond Drill Carbon Co.

Boxes, Cable Junction:
Standard Underground Cable Co. of Canada, Ltd.
Northern Electric Co., Ltd.

Brazilian Rough Diamonds:
Diamond Drill Carbon Co.

Brazilian Mica:
Diamond Drill Carbon Co.

Buggies, Mine Car (Steel)
Hendrick Manufacturing Co.

Brazilian Ballas:
Diamond Drill Carbon Co.

Brazilian Rock Crystal:
Diamond Drill Carbon Co.

Brazilian Tourmalines:
Diamond Drill Carbon Co.

Brazilian Aquamarines:
Diamond Drill Carbon Co.

Bridges—Man Trolley and Rope Operated—Material Handling:
Canadian Mead-Morrison Co., Limited

Bronze, Manganese, Perforated and Plain:
Hendrick Manufacturing Co.

Buckets:
Canadian Ingersoll-Rand Co., Ltd
Canadian Mead-Morrison Co., Limited
The Electric Steel & Metals Co
R. T. Gilman & Co.
Hendrick Manufacturing Co.
Canadian Link-Belt Co., Ltd
Marsh Engineering Works
Mussens, Ltd.
MacKinnon Steel Co., Ltd.
Northern Canada Supply Co.
Fraser & Chalmers of Canada, Ltd
The Wabi Iron Works

Buckets, Elevator:
Canadian Link-Belt Co., Ltd
Hendrick Mfg. Co
Peacock Brothers Limited

Cable—Aerial and Underground:
Canada Wire & Cable Co.
Northern Canada Supply Co
Standard Underground Cable Co. of Canada, Ltd

Cableways:
Canadian Mead-Morrison Co., Limited
Fraser & Chalmers of Canada, Ltd
Mussens, Ltd
The Wabi Iron Works
R. T. Gilman & Co

Cages:
Canadian Ingersoll-Rand Co., Ltd., Montreal, Que
Northern Canada Supply Co
Fraser & Chalmers of Canada, Ltd
The Electric Steel & Metals Co.
The Mine & Smelter Supply Co.
Mussens, Ltd
The Wabi Iron Works

the Mining Corporation was satisfied with the results obtained should prove to be correct. This belief lends significance to the reports now appearing in the papers and many will believe that a new deal has been or is being arranged.

Porcupine V.N.T.

At a meeting of shareholders held on April 12 the question of reopening the Porcupine V.N.T. mine was discussed. It was decided that it would be necessary to postpone the resumption of operations until conditions improved. The company needs a large sum to carry out its plans for development and eqnipment and will not attempt to proceed with its plans until money is more plentiful and costs lower.

Major J. Macintosh Bell, vice president, reported that the mine is in good shape. The Associated Gold Fields of Australia is largely interested in the enterprise and is expected to assist in financing it. The directors of Porcupine V.N.T. Gold Mines are Sir Henry Pellatt, Major Bell, J. W. Bain, J. H. Black, R. T. Shillington, W. H. Stafford and Capt. Denis Stairs.

Kirkland Lake.

It is reported that operations will shortly be resumed at the Tough-Oakes mine. The Wright-Hargreaves is expected to put its mill in operation about May 1. With these two companies and the Lakeshore, Teck-Hughes and Kirkland Lake companies actively mining the main ore deposit of the Kirkland Lake area will be the source of a very large annual output of gold.

EDITORIAL

THE SCOPE OF THE ENQUIRY OF THE FUEL COMMITTEE.

The reference of the parliamentary committee on the fuel supply of Canada instructed them to enquire into "all matters pertaining to the future fuel supply of Canada", and for that purpose empowered them to question witnesses and require the production of records.

The main object of such an enquiry as the Committee was directed to conduct might be expected to educe the facts concerning the extent and availability of fuel resources in Canada, their stage of development, and their ability to supply the future population of this country.

Up to now, however, the Committee has concerned itself more with the cost of Canadian coal to the National Railways, rates of miners' wages, housing conditions, corporation finance and the finding of freight business for the Canadian Mercantile Marine than with the major questions of reserves, development and future output of power from our fuel resources.

As an example of the attitude of the Committee, it may be mentioned that after much debate among the members, (some of the Committee being unable to see the relevance of the request to the warrant of the Committee) it was determined to require the personal presence of the auditors of the coal companies whose representatives had been examined, and the production of the original mine-cost sheets for each month from 1912 to date. For the Nova Scotia coal companies concerned alone this request requires the bringing to Ottawa of between 3,000 and 4,000 sheets of complicated calculations, any one of which, properly studied, might occupy the time of the Committee for days. It may be further mentioned that complete information on the coal mine production costs of Canada, to within quite recent months, is in the hands of the Government at Ottawa, through the returns required to be made to the Fuel Controller, and a mass of information, which covers production, sales, distribution, mining, transportation and retailing costs, is available in concise and understandable form in the office of the Fuel Controller.

Without minimizing in any way the capacity of the Fuel Committee, it is quite evident that if it undertakes a thorough-going inquisition into the entire business of the coal companies of Canada its sittings will be interminable, and even then but little of practical helpfulness in enlarging the development of Canada's fuel resources will be brought about, as the enquiry, so far so far we are able to assess its results, has led to criticism and discouragement of the few companies in Canada who are really helping the fuel problem by producing fuel.

The apparent diffidence of those intimately connected with the production of coal in giving out statements of cost is the natural fear that by disclosing the nakedness of the land too openly they may discourage Canadian people in belief in national fuel competence and may hearten our competitors in the United States to further continue their invasion of competitive coal markets in Canada and elsewhere. We doubt very much whether the broadcast publication of the admittedly abnormal costs of coal production at this time is in anybody's interest, except that of the United States producer of coal. It is an additional bolt for his quiver.

One fact that has so far escaped the observation of the Committee is that the high cost of coal production in Canada today is—so far as the century old industry in Nova Scotia is concerned—that coal has been sold in past years at prices below the cost of production because the coal companies have proceeded under the erroneous belief that the cost of coal consisted in the addition of the out of pocket expenses of labour and material expended in its production. They left the reckoning of depreciation, depletion of reserves, redemption of capital, disaster reserves, and the cumulative costs of undersea mining to posterity, and unfortunately, this generation happens to be that posterity. In the United States coalfields that supply Canada with coal today a similar error is being committed, and while the central provinces of Canada have reaped the doubtful advantage of getting an essential article for many years at less than its true cost the same kind of reckoning is on the way for the United States and its customers, although that reckoning may be deferred longer because of the unparalleled opulence of the coal reserves of the United States.

Another fact that the public does not grasp [illegible]

the high cost of coal production at this time, and the disappointingly gradual nature of the sealing-down of that cost, is a direct and foreseen result of the disorganization of the working forces at the coal mines in Canada that resulted from disproportionate enlistment of coal miners during the War.

The coal-mining industry today in Canada is paying, in high production costs and public discredit, for the sacrifices it made during the war. Conversely, the coal-mining industry in the United States, is reaping the reward of huge production during the war period, and of the circumstances connected with the entrance of the United States into the War that enabled it to draft men into its coal-mines, and not out of them. Not until the coming of new generations of miners, or until immigration has repaired the losses of the war, can coal-mining in certain parts of Canada hope to function as efficiently as it did in 1913.

PROTECTION OF PROFESSIONAL REPUTATIONS

The provision of the Professional Engineers Act of Ontario requiring that mining properties shall be reported upon by qualified engineers would seem, at first sight, to afford some hope of protection of the investing public against the supporting of fraudulent mine promotions by the reports of fake mining engineers. But is there any necessity for such a safeguard? Persons who commit frauds are not scrupulous in using the reports of qualified mining engineers, and, as everybody knows, they do it repeatedly by detaching opinions from their context and making entirely unauthorised use of written opinions without regard to the date of such opinion or its accompanying qualifications.

It is the fraudulent use of qualified opinion that is to be guarded against, and, for the purposes of the crook, the more reputable the name he misuses the greater the lure. That is why he uses it. As a factor in promotion literature the reports of pretenders to engineering ability are not important.

A speaker at the recent Annual Meeting of the C. I. M. & M. in Montreal, taking part in a discussion upon "blue-sky laws", very properly said that, from the standpoint of the engineer, the protection of his repute was of greater importance than the protection of the public against financial fraud. After all, in such matters as mine valuation, the probity of the examining engineer and his business acumen are assets not less to be desired than scientific competence, and there is no person that so innocently lends himself to the studied iniquities of the fraudulent promoter as the scientist. That is why an idea of professional qualifications which is based too exclusively on the possession of scientific knowledge, or upon a prescribed course of apprenticeship, will always meet with a certain degree of indifference from capitalists who have learned to put great stress on the personal equation and on ordinary horse-sense.

THE PROFESSIONAL ENGINEERS ACT OF ONTARIO.

The Professional Engineers Act of Ontario received its first reading on April 6th. It provides that no person can lawfully practise as a professional engineer, or collect fees for his work and advice in professional duties, unless he is a registered engineer under the provisions of the Act.

The mining industry is interested in a general way, inasmuch as most branches of engineering are represented in the daily routine of the mining engineer, but it is specifically interested by reason of the wording of the Act, which includes in the interpretation of the term "professional engineering", the advising on, the reporting on, the designing of, the supervising of the construction of, and the appraisal of "mineral property, mining machinery, mining development, mining operations, gas and oil development, smelters, refineries and metallurgical machinery".

So far as can be gathered from the rather indefinite drafting of the concluding provisions of the interpretation clause, the actual operation of mining properties and metallurgical works is not limited by the Act, so long as this proceeds under the direction of a professional engineer. The Act does not lessen the force of the Ontario Mines Act, the Stationary and Hoisting Engineers Act, or other well-established industrial statutes.

Apparently, therefore, the Act, so far as mining is concerned, will principally affect that class of men in private practice as consulting and reporting engineers, and will be inoperative and impossible of enforcement, because the gentleman who pays the piper calls the tune, and no law can be enforced to limit a capitalist in his selection of a man for the purpose of advising on and reporting on the value of mineral properties, or for the designing of mining structures, mining machinery and metallurgical processes.

It is pleasing to note that the scope of the term "professional engineer" is less cosmical than the definition which was attempted in a draft of a similar enactment in British Columbia, and included all branches of geology, both economic and pure research.

While the object of engineering status legislation is salutary, it being, we understand, intended to protect the public against incompetents and pretenders to engineering knowledge, there is a danger that it may come to be regarded as the refuge of the mediocre, and it may even be interpreted to the repression of invention and initiative if the letter of the Act be followed to the exclusion of its spirit and intent. For example, it is prohibited that anyone but a registered professional engineer shall advise upon and design metallurgical processes. How many epoch-making inventions have been evolved by men who were not professional engineers? To take but one example, that of the clergyman who invented the Capell ventilating-fan which bears his name; under the Professional Engin-

eers Act of Ontario, as drafted, that gentleman would have been refused the opportunity to develop his invention, as well as membership in a professional engineering society, both of which were freely granted to him in Britain. It is not recorded that the profession suffered thereby.

The Act proposes the limitation of the illimitable, the definition of the indefinable, and the specification of "engineer", which is a science inherently unspecifiable, in a paragraph. We imagine that if the Act is made law in Ontario it will prove as unenforceable, so far as mining matters are concerned, as similar acts on the statute books of Nova Scotia and Quebec.

MINING IN MANITOBA.

The "Journal" is informed by a correspondent in Manitoba that the overdone and far-fetched promotion advertising of mining flotations that has been a disgraceful feature of Winnipeg newspapers in recent months has had the inevitable result of killing public interest in the progress of mining in Northern Manitoba, and of frightening away enquiring investors. Hundreds were invested by persons who were promised millions in return, and naturally the millions are not forthcoming. In the Rice Lake district, in particular, quite a little money has been spent in furtherance of promotion schemes, but mines are not usually worked and developed by brokers. Dr. Alcock and Prof. DeLury have both been careful to point out that there are some really promising prospects in this district, but that no financial success is to be looked for until cooperative effort succeeds individual operation of properties, and until facts are substituted for fiction in the prospectuses issued by persons who are much more interested in mining the public than they are in mining gold out of the ground. A friend of the "Journal" writes in part as follows: "Surface indica-"tions and geological formations in this district can "not fail to impress one, and it is altogether unfortu-"nate that we cannot get legitimate assistance to go "ahead. It will undoubtedly come in the very near "future, but, for one reason or another, many good "mining properties have passed into the hands of out-"side capitalists when it was too late for those on the "spot to realise what opportunities were missed, "chiefly for the reason that stock promoters made "things look absolutely ridiculous to the business man, "whereas they had a good honest proposition all the "time..... We have too much evident wealth in "Manitoba to have it fooled with any longer."

The body primarily concerned in this matter is the Manitoba Government, which has a duty to perform in protecting the good repute of the Province. The protection of the public against fraudulent mining stock-issues is admittedly a difficult task, but it is one that many persons sincerely believe devolves upon the government that issues the charter of incorporation. The duty of protecting the good name of a province is, however, very plainly that of the provincial government. Whatever legal means the Province of Manitoba may now have of squelching the lying advertisements that have been scattered abroad throughout Canada and the United States should be quickly used, and if the statutes are insufficient to protect the repute of mining in Manitoba, new enactments should be considered.

In appointing a Commissioner for Northern Manitoba, and in arranging for widespread publication of geological reports that tell the truth about mineral prospects in that largely unprospected territory, the Government of Manitoba has acted well and wisely. In this regard no province in Canada has improved its opportunities more quickly and more judiciously, but, unless quick steps are taken to "check exaggerated stories and illegitimate promotions" (to quote Prof. Delury) the good work of the past will go for naught, and Manitoba will get a bad name.

There are citizens of Manitoba who have put good money into the development of mining prospects, and they have refrained from publishing prospectuses or seeking to interest the investing public until they could honestly state that they had proved a body of ore that justifies the development of a mine. The probity and legitimate enterprise of these men should be protected against the operations of about as fine a collection of unscrupulous promoters as North America can show, if the literature now emanating from Winnipeg is any criterion.

MR. RICKARD ON DISCUSSION OF TECHNICAL PAPERS.

In "Mining & Scientific Press" of March 2nd, Mr T. A. Rickard comments on the March bulletin of the Institution of Mining & Metallurgy, which contains 12 pages of discussion and 17 pages of original contribution. "This proportion" states Mr. Rickard, "is a normal one with our mining engineering friends across the Atlantic, and indicates a healthy interest in what is being published by their society." He deplores the failure of papers read before the A.I.M.M.E. to elicit discussion, and asks, "Are we afraid, too tired, or too busy, to criticize, to comment, or to give credit where credit is due?"

"In Toronto cellars there are large quantities of minerals which might be interesting in a museum, but are of no value for heating purposes. Apart from the injustice to the consumer, there is waste of power in carrying these specimens from the mine to the home." Thus comments a Toronto newspaper. The reference is presumably to anthracite. We suggest the use of gas fuel, obtained from coke ovens, using bituminous coal, and yielding by products. The day when anthracite will be exhibited as a museum specimen in Toronto is one that our grandchildren may see. They may also amuse themselves by reading of the current practice of the Twentieth Century in burning fuel for communal uses in a vast number of individual fire receptacles. The use of solid, or "raw" coal, will be looked back upon as a not less inexplicable practice. Even at this date it is an expensive anachronism, and a thorough-going public nuisance.

The Passing of a Canadian City.

By C. M. CAMPBELL.*

Phoenix, in the province of British Columbia, is, by the grace of the laws of that province, classed as a city. Incorporated over twenty years ago, with a population of 800, it gradually increased until it contained over 2,000 residents. In the last few years, however, citizen after citizen has packed up his belongings and moved elsewhere and its present claim to notice is the fact that it is completely abandoned. When the results of the coming census are published it will hold a record that it is hoped will be approached by no other community.

Worked-out and deserted lode-mining camps in British Columbia are few and usually commemorate an industry of small size. In the case of Phoenix, with its schools, churches, banks, graded and paved streets and other attributes of city life, the industry was of such a size as to give the camp a prominent place among the world's mining districts. Ores from Phoenix supplied the entire tonnage of the Grand Forks smelter, for years the largest smelter in the British Empire and the second largest in the world; an appreciable part of the tonnage smelted at the Greenwood smelter, also a smelter of the first magnitude; nearly the entire tonnage smelted at the Boundary Falls plant and a million tons of the total smelted to date at Trail. From these ores, amounting to 16,000,000 tons, about 350,000,000 pounds of copper and $16,000,000 in gold and silver have been produced, having an aggregate value of $65,000,000.

For many mines the shipment of a carload of ore is an event of some importance, while the shipment of a trainload at a time is worthy of record. The Phoenix output was on such a scale that, for the greater part of two decades, with almost clockwork regularity, year in and year out, four train loads, comprising over 4,000 tons and often over 5,000 tons, were sent down the hill every twenty-four hours.

That Phoenix appeared on the map when it did is one of the results of the building of the Dewdney Trail through Southern British Columbia. Prospectors, using that trail as a base, penetrated the Boundary District and located the chief claims about Phoenix in 1891, at almost the same time as the locations were staked on the slopes of Red Mountain, which afterwards caused such a rush to Rossland. Due to the lack of railway facilities, the Phoenix properties were much slower in being developed and it was not until 1900 that shipments began and the city was incorporated, taking its name from one of the claims included in the townsite.

Looking North over Phoenix, B.C.

Among the mining companies operating there the chief place must be given to the Granby Consolidated Mining, Smelting and Power Co. Financed chiefly by Eastern Townships capital it took its name from Granby, Que., the home of the late Mr. S. H. C. Miner, its first president. The controlling interest was later sold to New York parties. MacKenzie and Mann were also identified with Phoenix, in connection with the organization known as the Dominion Copper Co., which was later absorbed by the B. C. Copper Co. This company in recent years, as the Canada Copper Corporation, opened up the big mine near Princeton, B. C. The Gold Drop mine, owned in Montreal and the Snowshoe mine, owned in England, after being operated by the original companies, or leased, were later taken over by the Granby Co. The Phoenix Amalgamated Co., organized by Sherbrooke, P. Q., capital, was latter sold to the Consolidated Mining and Smelting Co. of Trail.

*Resident manager, Granby Consolidated Mining & Smelting Company, Grand Forks, B.C.

In the early days nearly all the inhabitants were English-speaking. The fact that Eastern Townships money was heavily invested and that the Eastern Townships Bank did all the banking resulted in a large number of young men from that area trying their fortunes in the west. Large numbers of Nova Scotia men were also coming west in those days and any man from Cape Breton or Antigonish would find himself at home in any western mining town. They not only manned many of the collieries but formed a very appreciable part of the population of the metal camps. The picturesque figure and kindly nature of William Yolen Williams, one of the early superintendents, drew many men from North Wales. Added to these were men from the neighboring States and other parts of Canada and the Old Country. Later an appreciable number of Swedes and a few Finns and Italians decided to make Phoenix their home and the gradually increasing shortage of labor resulted in the names of a large number of Austrians appearing on the payroll. There was some anxiety when the war broke out as to how the Austrians would act and while a few were very pro-German, and moved out or were interned, the great majority were quite peaceably inclined and gave no trouble whatever. Quite a number were, in fact, Jugo-Slavians and several of these returned to their Old Country and served with the Servian army.

Early in its life the Miners' Union took a decided stand on the Chinese question and no Oriental ever resided in Phoenix. On one occasion one of the young men of the town, with a gift of impersonation, dressed up as a Chinaman and sauntered down town in the twilight. His welcome, however, was such that he dropped his disguise with all possible speed.

The Doukhobors came to the valley below Phoenix about 1908. Work about a mine, however, was not in their line, though they could frequently be seen about in the summer peddling vegetables. Eastern Canadian illustrated journals have recently been publishing eulogistic articles and photographs dealing with their simple life and quaker-like habits. There is no use denying that they lead the simple life, that they are a well built race, cleanly to a large extent, appear to be good natured when allowed to disregard the laws as has been the case to date, and are industrious as far as their own needs are concerned. There is, however, as much difference between the Quakerism of John Bright and that of Peter Veregin as there is between day and night. The War tested a good many classes and though the Quakers did not appear as fighters on the firing line they justified their existence in many other ways. Beyond donating a few pounds of jam, which gift was coupled with a request for the remission of certain taxes, the Doukhobors did nothing for the Allies during the War; while due to the increased value of their products they did considerably for themselves. Though the Doukhobors have been in Canada with us for a quarter of a century, and members of this community, born in Canada, have reached man's estate, only a few of the boys have received a rudimentary education. They are still Russian peasants. The authorities have played a supine part, for if they had insisted on education in the first place, instead of eventually, there would be no Doukhobor question today.

Looking East from Phoenix, B.C.

The religion of the Doukhobors is based largely on a combination of ignorance and fanaticism and their motto would appear to be "Ourselves Alone". This combination has had a logical result in that a section of this race, living by the Granby River, live in an unkempt state and habitually go about in a nude condition. They have developed such a stage of fanaticism that they believe that when one dies the body should not be wasted by burial but should be left for the animals to devour. They have therefore been convicted in the courts for non burial of the dead and are under suspended sentence. Whether they have given

over this practice or not is not known; no more dead Doukhobors have, however, been left by the main highway.

Canadians who sympathize with the Doukhobors, and who accuse their neighbors of intolerence, and people of this class have been found in high places, should remember these things. They should also remember that during the period the Doukhobors have lived here no births have been registered as called for by law; no marriages have been legally performed or deaths properly reported. Their religion forbids them to kill. When this is taken literally and is applied to vermin of all kinds the result can be imagined. There is some encouragement in the fact that the thin edge of the wedge is entering here and they are now reported to have put gophers on the black list. They are praised to the skies as agriculturists, yet, for the reason mentioned, their work is confined to the vegetable kingdom. Dairying, poultry-farming and cattle-raising mean nothing to them, and land and products suitable for these industries are wasted. Even their crops run decidedly lower per acre, and vastly lower per capita, than those of the average farmer.

Most Canadian cities have some distinctive feature which they are not slow to advertise. Vancouver and Montreal take justifiable pride in their parks. Stanley Park gives one a first hand impression of the beauties of the coast forests, while from the summit of Mount Royal, at an elevation of 700 feet above the valley, a wonderful panorama is unfolded.

Soldiers' Memorial, Phoenix.

For natural beauty of surroundings, Phoenix, the highest incorporated city in the Dominion, takes second place to no Canadian city. Originally covered with a thick forest, all roads leading from it pass through more or less heavy bush. In particular, a drive along the road to the No. 7 mine, along the 4400-ft. contour, takes one through the timber for 10 miles with no sign of habitation except at the extremities. In the spring the glades are yellow with curly lilies; pink orchids can be picked up by the roadsides while yellow violets are dominant in many sections. In the right season you are almost sure to drive into a family of grouse which scatter among the branches above at your approach. There they remain so still that when driving under you can reach out from your car and almost stroke them.

From the hills around Phoenix one looks out at an elevation of one mile over the valleys 3000 feet below. To the north one can see range after range of heavily forsted and unnamed hills stretching to the horizon; to the east the snow capped ranges beyond the Arrow Lakes and the mountains about Rossland and to the south the mountains about Republic, an old and, at one time, an important mining camp. To the west the serrated peaks beyond the Similkameen stand clean cut against the sky while the huge mass of "Old Baldy", on the southern slope of which lies the old Caribeo-McKinney mine, the first lode dividend payer in British Columbia, dominates the landscape as it dominates the South Okanagan, when viewed from another direction.

In the winter it often happens that the mist settles down in the valleys and one looks out over a sea of clouds, with the distant mountains forming the far shore and the nearer ones the islands. Sometimes they rise and give Phoenix a fog bath and when they recede a little they leave a coating of hoar frost over the snow and over the trees. When the sun comes up into a cloudless sky and distributes its rays over the white clouds below and over the untold millions of glistening crystals covering a snow coated land the spectacle is one of indescribable brilliance. The memories of these views will be carried by former residents of the big mining town as long as they live.

The high elevation referred to resulted in one of the pleasantest climates in the Dominion. The season of high and uncomfortable summer temperatures was absent. It was always pleasant to get away from the hot valleys and feel the refreshing breezes as one ascended the hill. When the grass would be dry and parched below the summits would be green and dustless and Phoenix housewives would be out gathering wild strawberries or huckleberries. A walk about the hills

A Bonspiel in Progress at Phoenix.

could also be made without annoyance from mosquitoes for, in common with all the other parts of the Boundary, there was an almost entire absence of that plague. The occasional cold spell in winter was also tempered by the elevation and it was seldom that the mercury dropped below zero. The average of the December, January and February readings showed 24, 17 and 25 degrees above zero. Few thaws occurred and the result was a thoroughly enjoyable winter.

The cooler summer greatly limited the extent of gardening operations. Radishes, lettuce and green peas would do particularly well, but such vegetables as carrots and potatoes seldom attained full size. Truck farmers from the valleys were, however, usually on hand with an ample supply at reasonable prices. Perennial plants and bulbs were in their element and citizens who cultivated these flowers will miss the thousands of blooms that beautified the gardens and hillsides.

For the motorist especially the location was excellent. Though only about 40 miles of good roads extend to the east they extend as far as Christina Lake and nothing

more beautiful than this lake can be found beyond. Southern B. C. roads seem to have a supply of good road material always available and there are some wonderful stretches of excellent roadway passing scenery more wonderful still. West of Phoenix one can travel for hundreds of miles through the Kettle, Okanagan, Similkameen, Nicol aand Thompson valleys with the greatest comfort and pleasure.

Phoenix was what is known as a low-grade copper-mining camp and as such it holds the world's record for mining, *at a profit*, ores of this type lower in grade than any that have been mined before or since. The figures submitted represent ore with a recoverable value of about four dollars per ton. In the early years much higher-grade ore had to be handled but before long costs were reduced to such an extent that ores from which only three dollars, and even less, could be recovered were successfully mined.

The value of a camp like Phoenix means vastly more to the country in general than to the shareholders of the different companies operating there. Of the total recovery of $65,000,000, the operating companies received about $9,000,000 in profits and salvage for property, which cost about $1,000,000, and equipment, which cost close to $4,000,000, or a net return, during 20 years of development and operation of about $4,000,000. As all property was originally obtained free from the government the million dollars referred to approximates the profit to the prospectors and the small companies who turned their claims over to the larger concerns.

The Phoenix camp was only the starting point of a long chain of industries. The ore loaded in the cars meant an expenditure of $16,000,000, and of this only $9,000,000 was paid in wages in Phoenix and of this the great bulk was expended in different parts of Canada and elsewhere for the necessaries of life. The remaining $7,000,000 was spent for mine supplies. For many years 80 boxes of dynamite were used per day at one of the big mines alone and in all over $3,000,000 was handed over to the powder companies, whose plants are on the Pacific Coast. Fuse and caps from Cornwall, England; mining machinery and machine drills and parts mainly from Quebec and the United States; drilling-steel mainly from Sheffield; coal and coke from Fernie; pipe from Quebec and the United States; manganese steel from Hadfield's, Sheffield; rail from Pittsburg; timber obtained locally; customs duties and freight represent some of the further expenditure of $4,000,000.

After being loaded on cars the railways were paid $6,000,000 to haul to the different smelters. The expenditure for smelting and converting to blister copper averaged about $1.50 per ton or a total of $24,000,000. The chief supply used at the smelters was coke, which averaged 14% of the ore charge or 2,240,000 tons. This means that the entire output of a fair-sized coal mine, with accompanying coke plant, was used to supply the fuel required in smelting Phoenix ores. For coke alone the cost was $10,000,000 at the ovens with an extra freight charge of $6,000,000. The remaining $8,000,000 of the smelting charge was paid in wages and for supplies and, as before, the great part was eventually spent outside the district. There is still $10,000,000 of the total unaccounted for and this was paid to the railways for transporting the valuable blister copper across the continent, to the refiners for treating and marketing and to the Dominion and Provincial governments for taxes.

The heavy expenditures for railway freights will be noticed. Mines, and the various industries depending on them, supply, in many countries, half the tonnage hauled by the railways, and this tonnage is uniform throughout the year. In Southern B. C. this proportion has been exceeded and the Crow's Nest Coal fields together with the Slocan, Rossland and Boundary ore districts and the shipments from the different smelters, averaging well over $10,000,000 per year of high grade exportable freight, have kept many o train-crew busy. Notwithstanding this a leading member of the United Famers' organization, in the recent election in Yale, stated that as the farmers were such heavy shippers they should have special consideration from the railways. There is many a railway that the farmer uses that would be still unbuilt were it not for the mining industry.

The amount received by the Dominion Government in duties and taxes, directly and indirectly, must also have amounted to millions of dollars, for the average duty on imported machinery was close to 30% and the taxes in recent years have been heavy. Notwithstanding this the copper producer has to his credit the fact

A Phoenix Home (now abandoned)

In the distance the clouds can be seen to have settled down on the valleys and resemble a lake

he has never received any government bounty or protection, in any shape, on his products. Not only does he pay excessive duty on foreign machinery with the exception of certain smelting equipment and the American price plus the duty on Canadian machinery, but he also pays higher prices for his food in order that that great theoretical free trader, the Canadian rancher can control the local market and use it as a dumping ground for a non-exportable product. This is a condition of affairs that is approved not only by the Conservative party but also, as evidenced in the recent Yale

election, already referred to, by the Progressives and Liberals who united in indorsing a candidate who spoke strongly in favor of maintaining the present duty on fruit. The result has been that Phoenix citizens, living in Southern British Columbia, famed as a fruit-growing district, probably held the world's record for the consumption, per capita, of second and third-grade apples.

The copper industry of Canada has, while perhaps not intentionally, at least actually, played the part of a public benefactor. Considering the money invested, the past results and the future prospects, it will be acknowledged, if the different operating companies are checked over, that it would have paid them better to have put their money in the savings bank in the first place. Their attempts to better their own circumstances and at the same time develop the country, have not only received no encouragement from the Ottawa Government in particular but, in the matter detailed in the following paragraphs they have, especially in recent years, been treated with a large measure of contempt.

Phoenix was the location of some of the most important work done by the Geological Survey of Canada. A map of the entire Boundary District, showing the surface geology, was prepared by Brock in 1902. In 1908 LeRoy and Drysdale studied the geology of Phoenix in minute detail and their conclusions were of the greatest use in the mining industry. The geology of Phoenix was extremely difficult and had baffled previous geologists who had tried to size up conditions in a short time. It is not too much to say that this detailed report saved the different mining companies at least $100,000 and if these conclusions could have been arrived at some years earlier, the saving, due to the fact that less outlying property would have been purchased and less development done, would have been several times that figure.

The Geological Survey is the foundation, not only of the mining industry but of other basic industries as well, as their functions include reports on water supplies for irrigation and domestic purposes and the mapping of the forest areas. One would think that the valuable work done by this small body of men would have been so appreciated by the different governments that they would have assisted the Survey to the limit of their power. If there is one lesson the late war taught it is the value of a scientifically-trained corps of men. Of those mentioned as identified with Phoenix, Brock was selected as chief geologist to accompany the Allenby expedition to Palestine, while DeRoy's ability was used to advantage in connection with the organization of the Western Universities Battalion and later, as a brilliant captain of infantry, he laid down his life at Passchendaele. Such was the type of service rendered by the Geological Survey during the war.

The work requires highly trained and capable men. At times it is dangerous—Drysdale, the third geologist connected with Phoenix, was drowned while exploring in East Kootenay. Most of the time the members are away from civilization and their families. They are naturally not allowed to take advantage of information that comes to them in the course of their work and until recently their salaries were in the same class as those of ordinary clerks. They are still such that members are rapidly vacating their positions even for college work, which has not been considered particularly remunerative in recent years. The number of geologists for the whole Dominion has now dropped to nineteen, and as British Columbia stipulated when joining Confederation that the Survey should be maintained in that province eight of these are in B.C. The number is rapidly decreasing and as a member resigns the pennywise policy is not to replace him so that in a short time we will be without a Survey worthy of the name. In fact, that is the present situation.

A Phoenix mining company which spent over half a million dollars in recent years in a fruitless attempt to acquire other properties applied for the advice of a geologist in some special work. It was promised by the Minister, but was never given. Not only is it impossible to get any help of this kind but new publications of the Survey are getting fewer and fewer. The catalogue lists page after page of titles that are all out of print. An important map like that of the Kamploops Sheet has been out of print for 20 years. The topographical and geological maps of the Survey have been of vast assistance to prospectors, particularly in Northern Ontario and Northern Manitoba, where the maps of the Survey are the only maps ever issued and where one would quickly be lost in the ramifications of the watercourses were it not for the detailed maps provided. The lack of prospectors, frequently complained of, is due, to a large extent, to the lack of maps showing likely prospecting areas. The lack of traffic for the railways, and consequent enormous deficits, is not going to be remedied in the least by the suppression of the most important department concerned with the investigation of our natural resources. If the present interest in the Fort Norman oil district results in the location of commercial oil-fields, it will be on account of the fact that Geological Survey many years ago covered this territory, mapped it and marked it as a likely oil-field.

Forty years ago the government had Dr. Bell make annual trips into the territory tributary to Hudson Bay. This work was long ago abandoned and we know less about that district now than we did then. In the meantime we have built a railway practically into Port Nelson and spent millions of dollars on harbor improvements there. We have now stopped all work and are going to continue Dr. Bell's explorations and find out if the railway hadn't better be re-located to Churchill and the Port Nelson proposition abandoned. For the sake of saving a few thousand dollars in maintaining a Survey we have lost millions due to deterioration of the present road and probable re-location.

It was brought out at the recent mining convention at Vancouver that Dean Brock, while Director of the Survey, had six different Ministers in charge of his department in sixteen months. Minister of Mines continues to replace Minister of Mines with amazing rapidity and it is doubtful if the Director can do more than keep track of them. Senators, prairie lawyers, ranchers, and anybody to whom the work is likely to be uncongenial are all given this portfolio and few have been in office long enough to get interested in their department except apparently to curtail expenditures. There is little consolation in the fact that such names as Logan and Dawson will be known in this country and in other countries long after the names of the politicians who have acted as Ministers of Mines have passed into oblivion.

Labor troubles may be said to have almost passed Phoenix by. With the exception of a few weeks shutdown in 1907, while wages were being readjusted to the lower price of copper there was never any troubles whatever. During the entire period of the War and afterwards the men carried on during day shift, night shift and graveyard shift and on Sundays and holidays when necessary, with practically their old time efficiency and

although wages were raised as occasion demanded there was never any time lost on account of local labor troubles.

The easy adjustment of labor matters and the co-operation of the citizens with all parties and the usual absence of cliques, the bane of small communities, made Phoenix, aside from other advantages, a very desirable place in which to live. "There was always a good bunch in Phoenix" was a remark often made by those familiar with conditions and the manner in which they could get together was never better shown than in the construction of the big rink. Realizing the unsatisfactory nature of the old structure and the need of something better to take advantage of the fine winters, $10,000 was subscribed by nearly 400 residents in ten days and the finest rink in the interior erected. The shareholders never received a dividend and never asked for one. The profits for the first few years were put back in improvements and when the war came all profits, amounting to several thousand dollars, were handed over to the Patriotic Funds. It is also worth noting that, early in 1915, all employees voluntarily assessed themselves one day's pay per month for war purposes and this program was carried out through the duration of the War and for some months afterwards as an aid to influenza sufferers. Phoenix was one of the very first cities in Canada to adopt this scheme and in this case it was commendable as so many of the citizens were of foreign origin.

Phoenix was always fair to the different political parties and Socialist, Liberal and Conservative members have all represented that place in parliament. Political meetings, though few, were always well attended and appreciated. The outstanding meeting of this character, which is still talked about wherever old Phoenicians gather together, was the one about 1905 when Mr. W. W. B. McInnis talked on Socialism. Phoenix was then the headquarters of the Socialist party in the Interior and every Socialist off shift, and they were many, was at the meeting to stand up for his party. Mr. McInnis, in these days, was unexcelled as a powerful and ready platform speaker, and much to the entertainment of his audience, not Socialists, he was altogether too much for the combined efforts of his adversaries. Though unsuccessful on that occasion the Socialists later had their revenge when they elected their representative. Another well remembered meeting was when Tom Hardy, a local politician, spoke on behalf of one of the candidates. Tom's English was of the topsy-turvy variety and on every occasion when this was in evidence he was loudly cheered and when he finally started to discuss "the *exercise* duties of the *physical* year" the applause was literally "loud and prolonged."

The mining man, however, is not greatly interested in politics. Actively engaged mining engineers in the different legislatures are conspicuous by their absence or small representation. Their organization, the Canadian Institute of Mining and Metallurgy, flatters itself that it sometimes influences the Dominion and Provincial Governments in mining matters and doubtless it does, when its advice is agreeable to the Government, which is not as often as circumstances would seem to justify.

The stereotyped phrase "wild and woolly west" could never have been applied to Phoenix. While it is true that at one time there were 17 saloons there, all open 24 hours and all provided with the different gambling devices, it is also true that nobody ever carried a gun and the law was enforced without difficulty by one day-policeman, one night-policeman and a magistrate. In those days fully 30 professional gamblers led a parasitic existence and the ease with which, for years, the miner would hand over his money was rather astonishing. Probably the most exciting event that ever happened was the time when "Tuck" Collins tossed an imitation stick of dynamite, with lighted fuse attached, into the crowded back room of the Brooklyn Hotel and yelled "Fire".

A ROW OF MINERS' COTTAGES AT PHOENIX.

Safety First slogans were not invented in those days but the principle of self preservation is inherent and, as the fuse was short, the speed with which the room was cleared was remarkable.

No pork barrel appropriations were ever made for Phoenix, nor were any ever suggested. The Federal building was a rented frame structure which probably did not cost more than a thousand dollars. Notwithstanding exaggerated ideas prevailing in the early days in regard to the mineral resources the municipal authorities kept expenditures within bounds and when the last meeting of the council was held it was announced

that the corporation was not only free from debt but a few hundred dollars to the good. This in itself is no mean achievement and is worthy of record.

During the past summer the few remaining citizens, before abandoning their homes, made arrangements for the erection of a monument in memory of the men who made the supreme sacrifice in the Great War. A modest granite shaft now stands, at an elevation of 4700 feet, on an outcrop of rock, beside the highest point on the roadway over the divide between Greenwood and Grand Forks. This is the only stone structure ever erected in Phoenix and long after all the buildings have rotted away; the waste dumps and glory holes have been hidden by a new forest growth and the deer have returned to their former haunts, this shaft will remain as a memorial, not only to the men who gave up their lives in Flanders but also to the place they came from.

COAL PRODUCTION IN THE UNITED STATES COMPARED WITH NOVA SCOTIA.

The parliamentary committee of fuel resources now in session at Ottawa has devoted much of its time to elucidation of the diferences between coal mining in the United States and in Nova Scotia.

The following table will repay study.

Bituminous Coal Production.

	United States		*Nova Scotia*	
	Production	Increase over 1865	Production	Inc. over 1865
	Long Tons	Per Cent	Long Tons	Per Cent
1865	24,790,000	..	635,000	..
1870	29,950,000	21	830,000	30
1875	48,200,000	95	830,000	30
1880	66,830,000	170	1,050,000	65
1885	102,180,000	300	1,380,000	110
1890	141,620,000	460	1,950,000	200
1895	177,590,000	610	1,980,000	210
1900	243,410,000	880	3,230,000	400
1905	351,120,000	1,300	5,003,000	700
1910	445,810,000	1,700	5,740,000	750
1915	473,000,000	1,800	6,650,000	950
1918	605,000,000	2,300	5,200,000	720
1920	556,000,000	2,100	5,700,000	800

It might be fairly deduced from the above table that coal-mining is being conducted in the United States under conditions of unparalleled ease and ability to extend. This is precisely the case. There is no historical precedent for such a rate of increase in coal production, nor for such enormous quantities of coal actually mined and consumed within a given period.

The following table compares Nova Scotia with the United States on the production of 1905.

	United States		*Nova Scotia*	
	Production	Increase over 1905	Production	Inc. over 1905
	Long Tons	Per Cent	Long Tons	Per Cent
1905	351,120,000	..	5,003,000	..
1910	445,810,000	27	5,740,000	14
1915	473,000,000	35	6,650,000	13
1918	605,000,000	72	5,200,000	4
1920	556,000,000	58	5,700,000	14

The result of the war period is clearly shown in this table. In 1918, the United States was able to mine more bituminous coal (and more anthracite) than before or since, whereas the production of Nova Scotia declined. This was a direct result of the necessity of Canada to take men from the mines. The United States, on the contrary, were in a position, by reason of their truly selective draft, to draft men into the coal mines, and, realizing the need for coal, they did so. The contribution of the United States to winning the war is better expressed in terms of output of bituminous coal from 1915 onwards than in any other way.

The high cost of coal production in Nova Scotia is at this time due more to the disorganization of its working forces by enlistment than to any other cause, and it is a cause that must persist in operation until by natural birth increase, or immigration, the shortage of skilled miners has been made up. The idleness of collieries due to slackness of present demand has no bearing on this condition of affairs. It is quite possible for a condition of force disorganization to exist concurrently with a trade slackness involving idleness of collieries. If, when the collieries work, they have too few miners and too many non-producers, it merely aggravates the difficulties of the coal operators, who must choose between discharging hundreds of employees permanently or trying to give them all partial work.

PERSONALS.

Mr. S. C. Thompson has been appointed consulting engineer of Kirkland Proprietary Mines Ltd. and is making an examination of its properties: Sough-Oakes and Burnside, at Kirkland Lake.

Mr. Wm. Frecheville and Mr. J. B. Tyrrell are visiting mines at Kirkland Lake.

Mr. John Callahan is in Porcupine in connection with negotiations concerning the Gold Island property.

Mr. G. C. Bateman, manager of La Rose Consolidated Mines will address a meeting of the Toronto Board of Trade next week. He will speak on the Mining Industry.

Mr. Balmer Neilly will address a meeting of the local Board of Trade of Guelph on Wednesday, April 27. Mr. Neilly will show how the Province benefits from the activities of mine operators.

Wm. Fleet Robertson, provincial mineralogist, has been unable to attend to his official duties for some days because of illness. During his absence J. D. Galloway, Resident Mining Engineer, Hazelton, B.C., is Acting Provincial Mineralogist.

R. W. Thomson, resident mining engineer, Kamloops, B.C., who has been ill for several months is reported on the road to recovery. At present he is visiting the coast taking the rest necessary for recuperation.

The Toronto Branch of the Association of Women of the Mining Industry of Canada will hold a meeting on Wednesday, April 27, at the residence of Mrs. D. A. Dunlap.

Mr. A. F. Brigham, general manager of the Hollinger is in Toronto. He reports that the mine is now operating at full capacity and 3,300 tons per day is being treated. A contract has been let for construction of 150 workmen's houses and for a bunk-house for unmarried employees.

Mr. W. C. Campbell, mining engineer, has returned to Toronto from Mexico. Mr. Campbell was on the staff of the Ontario Bureau of Mines at Cobalt in 1906 and 1907 and had charge of the topographical mapping of the silver area. Before going to Mexico, he was in Africa for some years.

Mr. Frank Stevens has returned to Toronto after being for some time in Mexico.

International Mining Convention.

Portland, Oregon, April 5th to 9th, 1921

(Reported by our Victoria Correspondent.)

"The Mining Industry in Relation to Business," by Mr. Edwin Ludlow, president of the American Institute of Mining and Metallurgical Engineers, New York City; "Prospecting Past and Future," by Mr. T. A. Rickard, editor of the Mining & Scientific Press, San Francisco; and "Protection for the Promoter" by Mr. Sidney Norman, Editor of the Northwest Mining Truth, Spokane Wn., were among the notable contributions to the International Mining Convention held at Portland Ore. from the 5th to the 9th of April.

The Convention was attended by representatives from the States of Washington, Idaho, Montana, and Oregon; the Province of British Columbia, and the Territory of Alaska. There was a registration of delegates of between 600 and 700 and two Sessions were held practically every day from the 5th when Manager Henry M. Parks called the Convention to order until the business was brought to a close with the usual congratulatory exchanges on the following Friday evening.

Mr. Ludlow's Address.

Mr. Ludlow declared that the inhabitants of this country are directly dependent on the production of agriculture as well as of copper, lead and coal. The products of farms as well as of mines of America must find a market at a higher price than the cost of production. He traced the commercial history of the past few years, pointing out that the United States had been heavy exporters with the balance of trade very markedly in their favor. Under present conditions if trade was to be maintained it must be based on barter rather than credit. Europe owes the United States fifteen billion dollars. Never before had a depression been experienced in this country at a time when the nations of Europe were not financially able to take advantage of the fall in the value of securities during such periods to purchase the same in large quantities. Local production has been keyed up by war efforts far beyond the local power of consumption. There also was to be considered as a very serious adverse factor the matter of exchange. This might be simply explained by the statement that a South American merchant with ten thousand dollars in United States currency to invest would be able to purchase thirteen thousand dollars worth of goods in England, more in France and twenty thousand dollars in Germany. The condition was further aggravated by the prevalence in the United States of a "buyers strike." A cotton grower sold his produce at a materially reduced figure in comparison with war prices and went to a store to buy cotton goods only to find that war prices still maintained. He therefore refrained from purchasing. Much the same condition was to be found in all lines and the manufacturer would have to consider the advisability of reducing his prices.

In Europe cotton, wheat, copper and coal were badly needed, but they could not be obtained from America unless the trade was based on barter rather than credit. This brought up the question of the tariff and "whether a tariff wall would be built around this country to protect the manufacturing interests, rendering it impossible to extend that assistance which is needed not only to the majority of our people, but to the war-ridden nations of Europe who have nothing but the work of their hands with which to pay for the raw material needed. It is hoped that Congress will examine carefully the question whether the manufactures who are demanding this protection have done their share towards reducing the cost of living. Copper, lead, zinc and the products of the farm already are selling not only below 1914 prices, but below the cost of production and coal is arriving at this point."

Higher Tariff Will Hurt Mining.

Mr. Ludlow concluded by sounding a solemn note of warning. Mining and agriculture were basic industries, he said, and their future should be based solidly on good business principles and not on the protection of favored industries. If the tariff wall were built for the protection of the products of the mines and farms the production of those industries must be reduced to meet the needs of American alone. In the war of the survival of the fittest that would follow, railroad rates would handicap the industrial advance of the West. Many of the higher-cost mining projects would be closed down, and besides, the industrial recovery of Europe would be immeasurably delayed.

Mr. Rickard on Prospecting.

An exceedingly polished and instructive address was that for which Mr. Rickard was responsible. He referred to the many accidental discoveries of important mineral deposits in the past and then went on to deal with the scientific process of development. As instances of the latter he called to mind the persistence of the search of James S. Douglas in sinking a deep shaft on the United Verde extension, even after a first disappointment; also to the opening of the Suan concession in Korea by British and American engineers. In referring to proposed easy ways of locating ore underground he spoke of "The Divining Rod" the "magnetic needle to find masses of iron ore." "The method of measurement of electric resistance whereby the resistance of the earth circuit between two points is measured in order to detect abnormalities that point to the presence of ore bodies," "the telephonic method," in which the passage of electric currents in the earth is observed etc. He continued "The Hazel Twig as a means of divination may yet have as its successor some accurate method of finding ore, the Alchemy of one age is the chemistry of another. I am quite prepared to believe that honest scientific investigation will succeed in devising a way of obtaining guidance for the miner in his prospecting by detecting and measuring the emanations, resistances and other intangible reactions of matter on matter in such a way as to indicate not only qualitively but quantitively the presence of ore at a distance underground ever while it remains for the prospector to use the methods on which he can rely rather than allow himself to waste time and break his heart on schemes that are either fraudulent or fraudulent. The core-drill and diamond bit are well-tried tools, the shaft and the prospect hole will not deceive. After all the best instrument of investigation is the pick. There is intelligent curiosity in the point of it, there is strength in the handle of it, there is rhythm in the swing of it.

Mr. Sydney Norman on "Blue-Sky Laws."

Mr. Norman spoke very strongly regarding the ill effects of new-style legislation now in force in some thirty states of the Union. He went into the subject very exhaustively and maintained that the small promotor who is responsible for so much of the mining development of the past, was being driven out of the business. Illustrations were given to point to the absurdity of some of the method adopted in some states in connection with the enforcement of this legislation. It was his argument that if this legislation continued as at present it would mean the strangulation to a large extent of mining development. He advocated if Blue Sky legislation were at all necessary that it should be unified in its application to the United States, its administration being placed in the hands of a Federal Board.

This matter was the subject of much discussion the next day, the outcome of which was the passage of a resolution endorsing the principle advocated by Mr. Norman and calling upon these in authority to take concerted action to the end indicated.

Coal Mining in the West of North America.

Considerable attention was given to the coal mining industry, the three phases, Mining, Preparation, and Distribution of the coal of Washington and Oregon states being dealt with quite exhaustively by several speakers. Mr. Watkin Evans, consulting mining-engineer of Seattle Wn., took up the geology and the resources of the two States mentioned with brief references to the coal fields of Alaska, British Columbia, Idaho, Wyoming, Utah and California. Mr. S. H. Green, Manager of the Pacific Coast Coal Co., Washington, discussed methods of mining coal in flat and steeply-pitching coal seams. Perhaps the most interesting feature of this was his account of the unwatering of deserted workings in that mine. It had been found that sixteen million gallons of water were present in these workings and it was felt that it was a menace to life while remaining there. In removing it drill holes were bored from below through the cover of from four hundred to five hundred feet, gate valves being placed on these holes in the lower workings. In this way the water was drawn out as it could be handled and without difficulty. It was found that the space above immediately the water was taken away filled with "black damp," carbon dioxide.

Mr. E. R. McMillan spoke on the preparation of coal, including a description of types of tipples, screens, and the various jigs used in the screening and washing of coal in the Northwest. This was followed in the afternoon by two interesting papers, one by Ralph Gault, a fuel engineer, on "Utilization of Coal," including hand-firing, automatic stokers, and carbonization with special reference to powdered coal for steam generating. A. W. Perley of the Oregon-Washington Railroad & Navigation Co. then opened a discussion on the locomotive fuels of the Northwest. A paper that may be mentioned in this connection but was delivered later is that on the low-temperature distillation of coal by Kirby Thomas, consulting mining-engineer, New York City. All these addresses as will be noted are co-related and will be published as a unit, the intention being that at the next International Convention the same subjects will be handled in their application to the coal-mining resources and industry of British Columbia and the Canadian Northwest.

Gasification of Coal.

There appeared to be marked unanimity of opinion as to the desirability of the abandonment of present wasteful methods in the burning of coal. Solutions suggested were the treatment of coal by low-temperature distillation methods, the recovery in that way of by-products and then its use for domestic and general industrial fuel purposes.

British Columbia Day.

British Columbia day, Thursday, was marked by the assumption of full control by the (B.C.) delegates. Mr. Nichol Thompson, occupied the chair in the afternoon, and there were with him on the platform among others, Hon. Wm. Sloan, Minister of Mines for the Province; and Messrs. A. M. Whiteside, Vancouver; E. E. Fowler, Nelson; Fred Starkey, commissioner of the Associated Boards of Trade of Eastern B.C.; and J. M. Mulholland, President of the Prospectors' Protection Assoc., Nelson B.C.

Address of Mr. Sloan.

Mr. Sloan, addressing a fully attended Convention, said:—

When I am privileged to meet a gathering such as this, it always seems to me that, after all, there are some compensations in being a Minister of Mines. There is nothing more inspiring socially, and in respect of education, than these Conventions. There are nowhere to be found better citizens, more progressive businessmen, than among those whose business is mining. And you may search through the mining districts of the world without finding a better type of man, a man with a higher sense of his citizen responsibilities, and a man more loyal and true to his home country than you will find in the American West.

This is an "international" convention. These days the term "international" has more significance almost everywhere else than where we are privileged to live. Nationals in Europe, great and small, are squabbling and quarrelling over questions that no doubt are of importance to them. An international gathering there would be attended by ceremony and formality. But here, what do we find? We always feel as much at home among you as on the other side of that imaginary line. We are one because our language is the same, our habit of thought is the same, our culture has progressed among similar lines, and our heritage, the great and glorious land of America, brings to us the same problems and the same possibilities in the work of the development of its vast resources.

I should like to extend a cordial invitation to you all to come to British Columbia. We would be glad to have you, and because we might both find it good business. With that we must all agree. Besides I do not think some of you credit our Province with anything like all it has to offer. British Columbia covers an area of 390,344 square miles, equal in extent to the States of Washington, Oregon, Idaho and Montana. One of our great Canadian Statesman, about half a century ago, referred to our Province as "a sea of mountains." There was some point to this remark. It only now is being understood that this "sea of mountains" possesses a world of mineral wealth, only a very small proportion of which has been developed.

You will admit that we have not done so badly when I say that the mineral production of the Province from 1852 to the end of 1920 is estimated at $706,230,519. This for a large country, with a population of but 500,000, a figure which has grown from a few thousand when mining records first were taken, seems to me to be a creditable achievement. While, however, much has been done by a few the great task is ahead. I need only add, on this point, that we represent a country of tremendous latent mineral possibility in which there is plenty of scope for legitimate industrial endeavor.

Last year British Columbia's mineral production is estimated to have reached a monetary value of $35,580,625.

Its gold output totalled $2,707,698, a decrease as compared to the previous year.

Its silver production increased in quantity, 3,404,926 oz., as compared to 3,403,119 ozs.

Its copper production also increased from 42,459,339 lbs. to 42,773,660 lbs.

Its lead output showed that the monetary value of the 1920 output was greater by some thousands of dollars than that of 1919, viz., $1,540,471 as against $1,526,855.

Its zinc production jumped from 56,737,651 in 1919 to 76,765,268 lb. in 1920, an increase in value of $1,602,843.

The total output of its collieries increased from $11,975,671 in 1919 to $14,038,470 in 1920.

The aggregate increase in the value of the mineral production of British Columbia during 1920 over 1919 was $2,284,312.

You will gather from these few statistics that our mining industry has been advancing. I venture to say that out showing as to output at least compares favorably, figuring proportionately with that of the chief mineral producing States. We have been going ahead steadily in recent years. From 1911 to 1913 the production in dollars was $86,236,270; from 1914 to 1916, $98,126,795; and from 1917 to 1919, $112,089,179. After the slump of 1919 we felt proud to be able to point to a decline of less than 20 per cent, as compared to decreases ranging from 40 to 60 per cent in the cases of the chief mining States on your side of the line. These facts are not pointed to in a spirit of self-gratulation but rather to show that our Province, big in area, small in population, with its mining future before it, has been holding its own and besides getting a little further forward year by year in the work of developing its minerals.

We are faced with a decline in gold production. As a matter of fact every gold-producing country has been meeting with that condition. I am pleased that we seem, however, to be getting back to the conditions that will permit both placer and lode-gold mining to be prosecuted with more assurance of profit, in the future.

In discussing silver it is possible to assert, without reservation, that the future is full of promise. The new fields of the Salmon River and Alice Arm regions are attracting wider attention as their possibilities become more apparent. The Premier Mine is only one of the properties of the Salmon River zone to be heard from and I say this advisedly. After a very considerable expenditure in drilling, development, and general exploration, the directors of the Premier have agreed on further expenditures in plant and equipment. And if one paying mine has been proved, it is reasonable to suppose that others will be developed, especially when surface indications are so numerous and so encouraging. What is said of this district may also be applied to Alice Arm. There the Dolly Varden is being developed. In the four last months of 1919 it shipped 7,000 tons of ore averaging 56 ounces of silver to the ton, and also was a large shipper in 1920. Further development is in progress on this and other properties. But when considering the silver camps of British Columbia do not let us overlook the Slocan and other sections of the Kootenays of Eastern B.C. The mines, and the possibilities, of these districts, are of great importance; the former furnish the greater part of the silver production of the province and the latter offer opportunity to the prospector and the operator. What I have said is only to illustrate what is happening in the various fields in British Columbia, and to those desirous of obtaining further information I would recommend them to read the reports of the various district engineers, as published in the annual report of the Department of Mines.

In referring to the copper, lead and zinc production of our province we must pay a tribute to the enterprise of such concerns as the Canadian Consolidated, the Granby Consolidated, the Britannia Mining Co., and the smaller operators of the Interior and of the coast. The former company has opened up a wonderful Mine in the Sullivan, of Kimberley, a property that is taking a leading place in America as a producer of zinc and lead. It also has gone a long way at the Trail smelter to solving the problem of the economic treatment of silver-lead-zinc ores. The Granby Company at Anyox has evidenced enterprise in the installation of by-product cooking ovens, opening up in this connection certain coal areas on Vancouver Island. The Britannia Mining Co., Howe Sound, has become in a few years one of the biggest producers of copper in the Province. These, however, are but a few outstanding instances where capital has come to the aid of the prospector, and the small operator with success and there are numerous cases where similar industries but await the necessary development to become as notable and as successful enterprises.

I do not hesitate to say that our Government is alive to the importance of the mining industry and has shown it in many practical ways.

It has placed competent mining engineers in the field.

These engineers advise prospectors and operators as to promising fields and as to the best means of opening up locations.

The Government gives financial aid in the construction of trails and roads to properties recommended by these engineers as having merit. There have been constructed and maintained since 1917 mining roads and trails of a total mileage of 3,901.

Mineral exhibits are being placed at the six established mining centres of the province, special attention being given to the rarer minerals so that the prospector may become acquainted with them and thus be better able to recognize them in place.

The Mining Engineers have been spending a part of the winter months in delivering lectures of a practical character to the prospector and the mining men.

It may be mentioned, too, that the Government has an appropriation for the purchase of powder for distribution to prospectors and miners at as near cost as possible. With regard to capital, so essential for continued and increased development, we realize that capital must have a legitimate return, and to that end our mining laws are founded on stability and are recognized throughout this continent as fair and equitable. This also it may be stated in our policy with regard to the important question of taxation.

Other important work that the Government has in hand is the improvement of underground working-conditions both in coal and metal mines, particularly from the standpoint of the safety of the lives of the workers. That we already have had success is shown by the fact that in 1919 there were but twelve fatal accidents in the coal mines and six in the metal mines of the province. This works out to a percentage of 2.2 in connection with the coal and a percentage of 1.2 in connection with the metalliferous industry.

We are improving the equipment of mine-rescue stations all the time, keeping them thoroughly up to date and maintaining close touch with your United States Bureau of Mines as to the latest developments in safety appliances, and mine-rescue apparatus. When something new and better than we have is tested and declared practical we do not hesitate or lose any time in securing it. The policy of the Department of Mines in this vital matter is to take the lead, and we wish to continue along that line.

On my suggestion I may state that a conference is to take place in September under the auspices of the United States Bureau of Mines, at St. Louis for a discussion of the question of standardizing mine-rescue apparatus, and particularly methods of use. I feel that at least there should be a standard method of training men so that those who learn to handle apparatus at one mine can go to another and take up their work without interruption. Consideration I think too will have to be given to the men who undertake this training and these are questions all of which will be considered at the conference referred to. Invitations to attend this conference have been sent to representatives of Great Britain, France and Belgium; and other provinces of Canada will also be represented.

Again I say it is a pleasure to be with you. After all the histories of the country to which we have fallen heir have much in common. Those common interests are recognized and also appreciated by the circumstance that to-day you have set apart as British Columbia's day. There are no stories more interesting than those told of the English, and Spanish navigators who first cruised the waters of the North Pacific. The tales also of the first pioneer settlers in this great valley of the Columbia are of particular interest for according to popular fiction, sport, or rather lack of sport had some bearing on the final division of this territory, now a great state. However the fact remains that for years after the first trading-posts were established, these pioneers of Oregon of Washington and of British Columbia were not divided. It was a region jointly occupied by the great nations to which we belong. The 49th Parallel then was recognized as a boundary only as far west as the Rocky Mountains. Not until 1846 was the boundary finally fixed as it now stands. This is in fact a geographical line not a line of fortification the necessity for which will never arise as between our people. Three-quarters of a century has lapsed since then and what a change! Oregon, Washington and British Columbia then possessed but 3,000 settlers. Now their joint populations will run to the 3,000,000 mark.

If this can happen in the space of the lives of many individuals it is safe to predict still more wonderful things for these great and comparatively undeveloped countries to which we belong. The future is assured. We are passing through an unsettled period, a temporary manifestation of war aftermath. In other parts of the world it is assuming a more serious aspect than in America. Elsewhere the very pillars of civilization are threatened and the menace is not altogether absent on this continent. We must and will successfully combat those elements that are bent on destruction to save for the coming generations all that we have achieved socially, industrially and scientifically, and to preserve all that we most treasure in our national life.

With a practical realization of the spirit of co-operation between us and with a joint concentration on the problems of developing our mining and other [illegible] industries, the extension of our commerce and the stimulation of [illegible] prosperity, success is assured, and [illegible] our [illegible] mutual destiny will be fully realized.

Problems of the Prospectors.

"The problems of the prospector" was a subject [illegible] entertainingly handled by Mr. J. W. Mulholland, [illegible]

sident of the B. C. Prospectors Protective Ass'n, Nelson, B.C. He commended the Government of the Province for the various steps taken to encourage the prospector in his search for mineral, but declared that the real old "*sour-dough*" was now but very seldom found. He soon would be as extinct as the dodo. Mr. Mulholland gave various explanations chief among which was that the pioneering efforts and the genuine worth of the prospector had not been recognized. He thought that the merchants and the business men would be well advised to more often heed the prospector's request for grub stakes. The day was when the prospector had no difficulty in finding necessary financial support, but that day had passed.

Mr. S. S. Fowler's Address.

Mr. S. S. Fowler dealt with the "Mining Industry of Southwestern British Columbia". By means of a map Mr. Fowler illustrated the country whose mining industry he outlined. He told of its development during the past sixty or seventy years. The opening of the Rossland Mining Camp, first discoveries in the Slocan, the origin of the now great smelting industry at Trail, the first locations at Kimberley, where now is situated the wonderful Sullivan zinc-lead mine, and other historical matters of interest in connection with this district were touched upon. Mr. Fowler traced the development of the district by means of improved transportation facilities. The first smelter at Trail obtained its coke from Pennsylvania, an exceedingly costly arrangement, and it was this that led in a measure at least to the construction of the Crow's Nest Pass Railroad and the opening up of the coal fields of the Crow's Nest. Here first-class coking coal was found and the greater part of the fuel necessities of the smelter since have been provided by these collieries. There have been constructed in this district alone 13,000 miles of railroads, and established besides some 370 miles of steamboat transportation. One of the most striking of Mr. Fowler's statements, however, was that of the seven hundred odd million dollars worth of mineral produced by the province up to 1920, three hundred million came from the East Kootenay district.

Nelson, B.C., was selected as the place of meeting for the 1922 International Mining Convention. Mr. F. Starkey extending an invitation on behalf of Nelson, which was enthusiastically accepted.

COLLIERY CONSUMPTION IN NOVA SCOTIA.

The Report of the Mines Department of Nova Scotia for 1920 fiscal year records a consumption of coal at the collieries of 8·6 per cent. If the coal sold to workmen is included, the percentage of output thereby rendered unavailable for commercial sale, reaches 11 per cent. This is a better performance than that of 1919, when colliery consumption reached 9.2 per cent and, with workmen's coal included, a total of 11·7 per cent.

There is a wide difference in the showing of the individual plants. The Acadia Coal Company, with a colliery consumption of 16,790 tons and an output of 539,641 tons, is credited with the remarkably low figure of 3·2 per cent. Comparing these figures with those of 1919 indicates that there may be an error in transcription, and that the figure should really be 5 per cent. In either case, the performance is a notable one, and indicates the results that can be obtained from a modern power plant such as is possessed by the Acadia Coal Company at the Allan Shaft. The Nova Scotia Steel & Coal Company, with a colliery consumption of 5·5 per cent, did extremely well. The Dominion Coal Company's figures disclose colliery consumption of 9·3 per cent at the Cape Breton mines, indicating an output disproportionately small to the extent of the power equipment. It is probable that with a normal output of 4,500,000 tons, instead of that actually recorded of 3,222,725 tons, the consumption of coal at the boilers would not be much increased. The Springhill Mines show a colliery consumption of 13 per cent. If the workmen's coal is added, the amount of output available for commercial sale is reduced by 16 per cent. This reflects the conditions of mining steeply-inclined seams, under very deep cover, characteristic of the Springhill mines. An even severer drain is shown in the case of the Inverness Colliery, where the colliery consumption reaches almost 18 per cent, and with workmen's coal added, 22·7 per cent of the coal raised. To put it another way, the quantity of coal required to operate the Inverness Mine in 1920 was almost identical with the quantity used by the Nova Scotia Steel & Coal Co. at Sydney Mines, but the output was 629,637 tons in the case of Scotia, against 180,502 tons in the case of Inverness. The Maritime Coal & Railway Company has a colliery consumption of only five per cent, an exceptionally creditable showing under the conditions on that property. The proportion of the output from the Nova Scotia coal mines which is required to provide motive power for mining operations and domestic heating for the mine workers has steadily risen since 1915 as follows:

	Per cent.
1915	8·5
1916	9·8
1917	11·4
1918	13·7
1919	11·7
1920	11·0

The reason for this apparent inefficiency is not clouded to those who know that in 1915 the working organizations of the mines was intact and properly balanced, that in 1916 commenced the drain by enlistments which culminated in the extreme disorganization of 1918, and that any improvement shown in 1919 and 1920 is due to such partial restoration of the working forces as has been found possible.

For comparison it may be stated that the boiler coal used at United States bituminous collieries amounts to but 2·16 per cent of the output. Good European practice, which includes very deep mining and very thin seams, shows colliery consumption of about 7 per cent.

SAULT STE. MARIE.

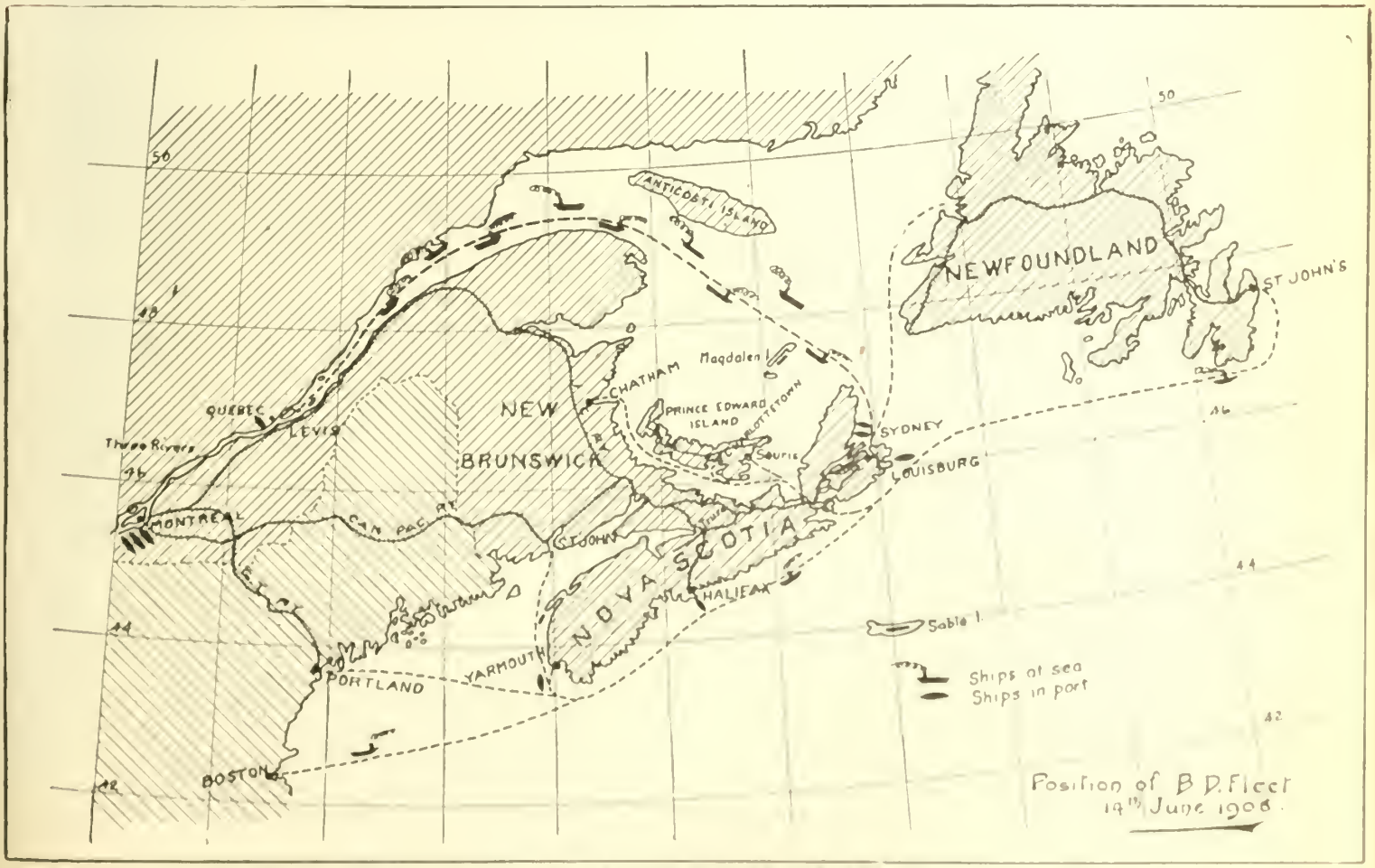
The presence of amygdaloid copper-ore in the strata underlying the City of Sault Ste. Marie is reported to have been disclosed by a churn drill being used to put down an artesian well for water for a drewery. The occurrence is reported by Mr. J. B. Miller, who states that he panned the sludge from the drill-hole and found traces of copper in the progress of the hole from a depth of 200 feet to a depth of 420 feet. The despatch from the Sault, as reported in the Sudbury "Star" states that when drilling operations were commenced the government geologists asked that samples of the drillings should be sent for examination as taken from various depths, not with any idea that a mineral deposited existed, but for general information. Samples have been forwarded as requested.

NOVA SCOTIA COAL AND THE ST. LAWRENCE MARKET.

The first boat from Cape Breton loaded with coal for St. Lawrence ports was the S.S. "Maskinonge" which sailed ex Louisburg for Quebec on the 14th April. The accompanying diagram may be interesting as a reminder of what the St. Lawrence coal markets meant to the Cape Breton mines before the war. It is re-produced from a description of the Dominion Coal Company's operations, written by the Editor of the "Journal" in 1908, and now out of print. The date was picked at random, and the disposition of the coal-carrying vessels which is shown may be regarded as fairly typical of the extent of the coal-freighting bnsiness before the war diverted trade from its normal channels.

The largest quantity of coal shipped from the Cape Breton collieries to St. Lawrence ports was in the Summer of 1915, when a quantity of between 1,900,000 and 2,000,000 tons was sent up the River during the season of navigation. The coal-consuming capacity of the St. Lawrence ports has greatly increased since that time, and it is probable that a market for 3,000,000 tons of bituminous coal exists in the Province of Quebec, that, were national considerations given proper weight, should all be supplied from Nova Scotia.

The possibilities of the Transcontinental Railway, from Quebec to Winnipeg, as a distributor of Nova Scotia coal sent to Quebec City by water, have not been realized. During a recent transportation congestion in the United States (sometimes referred to as a coal shortage in Canada) Nova Scotian coal was sent to pulp mills in the neighbourhood of Cochrane, and landed there at a price which was lower than United States coal delivered over the T. & N. O. at that point. The recent shortage of hydro-electric power has revealed the Porcupine gold-mining district as a possible large user of coal, as a stand-by and auxiliary to hydro-electric power, and a study of the map will show that the water-route to Quebec and the straight line of the Transcontinental Railway offers some attractive possibilities in the extension of the radius of distribution of Nova Scotian coal. The matter is not less interesting in view of the recent disclosures of the important diversion of western wheat through United States Atlantic ports. Whether North America were divided into two countries or not, it would seem that the vicinity of Cochrane were distinctly within the radius of economic distribution of Nova Scotian coal. There is the incidental consideration, which weighs very lightly with some people, that Canada is a separate political entity burdened with a heavy public debt, with desperately unprofitable public-owned railways, and containing unproductive coal-mines and idle miners. Under these conditions, there are some people who venture to believe that the country should test and find out what may be the economic limit of distribution of our own coals. The people in the West two years ago had certain ideas regarding the extent of economic distribution of western coal, ideas which today they remember only to laugh at.



IN THE DAYS BEFORE THE WAR.

This map was drawn for inclusion in a description of the Dominion Coal Company's operations, published in the "Journal" in 1908. On the date selected, taken at random, the Dominion Coal Company's fleet totalled [illegible] tons, comprising 19,000 tons steaming loading in port, 27,300 tons at sea loaded, 19,000 tons in port discharging and 21,000 tons steaming to port in ballast. The market for Nova Scotia coal in Montreal and district is much larger to-day than it was at that time, and is probably not less than three million tons annually.

Northern Ontario Letter

THE SILVER MINES.

The Cobalt District.

Silver quotations continued steady into the fourth week of April, and there is a general feeling that the panic caused by the precipitate decline was instrumental in forcing the price of the metal to a much lower price than is warranted by the law of supply and demand. Now that the market appears to have become stabilized, and it is found that world production of silver has declined to an alarming degree, it is believed not altogether improbable that an early upward fluctuation in quotations may be looked for. This is considered by mining men as the inevitable result of the working out of the law of equilibrium. As to the soundness of these calculations, time alone will bring the verdict, and the result will be of vital importance to Cobalt.

Although the Nipissing report contains the information that the result of development work during 1920 was unsatisfactory, and reports a decline of ore reserves to 3,568,000 ounces as compared with 6,354,000 ounces a year ago, there are certain favorable results which hold out promise for the future.

In 1920, the mine produced 2,631,323 fine ounces of silver valued at $2,543,024. This is somewhat lower than the preceding three years, but compares quite favorably with the average from 1908 up to 1917.

A favorable feature of the ore reserves is the fact that the estimated high grade ore comprises the greater part. This is made up of 1,851 tons containing an average of 1,183 ounces of silver per ton or a total of 2,188,903 ounces, as compared with low grade amounting to 70,814 tons containing an average of 19.5 ounces or a total of 1,379,224 ounces. The average grade of the whole reserve is 49.1 ounces. This compares with an average of 41.6 ounces in the ore treated during 1920.

Another favorable feature is that in spite of adverse economic conditions during the year, the company produced its silver at a cost of 37.4 cents an ounce. This compares with 35.6 cents an ounce during the preceding year. It leaves the company in a position to maintain a very satisfactory margin of net profit even with silver at the present low price.

About 15 p.c. of the total value of the monthly production from the Nipissing mine is made up of cobalt, as shown in the figures for the past two months. This metal swelled the company's income to the extent of $837.20 a day during March, as compared with $4,388.90 a day in silver. It is obvious, therefore, that cobalt has become a very valuable by-product from this mine.

Concerning the fire which destroyed the shafthouse at the Meyers shaft of the Nipissing, a temporary headframe has been installed and operations are being maintained at normal capacity. Beyond the cost of the fire, the company has not been embarrassed by the mishap, according to official advice to the "Journal", and this may be taken as a denial of the earlier unofficial reports that there might be some delay caused by the fire, with a consequent reduction below normal output.

Work on the Hudson Bay Mines will remain suspended until the price of silver goes up or the cost of operation declines. That is the official announcement received to-day in response to an enquiry. It will be recalled that this company borrowed some $20,000 last fall, with which to carry on development work during the winter, and it was intended to commence treating ore about May 1st. Considerable ore was developed, amounting to from 3,000 to 4,000 tons containing about 15 ounces to the ton, as well as a further substantial amount being indicated. However, the slump in the price of the metal upset the company's plans with the result as above announced.

The Chambers-Ferland mine of the Aladdin-Coblat continues regular shipments of about 25 tons of ore per day to the Bailey Customs Mill. In the meantime, a moderate amount of high-grade ore is also being encountered. In the new consolidation in which the Chambers-Ferland comes-under the control of the Kirkland Lake Proprietary (1919), Ltd., the work of superintending the operation of the Chambers-Ferland will be in the hands of Chas. A. Richardson.

In an interview with Major J. Mackintosh Bell, the correspondent of the "Journal" was informed that although operations have been resumed on the Keeley Silver Mines, the property will not be placed upon a producing basis until the market for silver strengthens. Major Bell declared that about 500,000 ounces of silver has been blocked out in ore containing between 25 and 30 ounces of silver to the ton. One ore-sheet contains from 45 to 90 ounces of silver to the ton, but, following the operation of the mill, it is planned to establish average mill-heads of between 25 and 30 ounces. For the time being, development work will centre at the 360-ft. level.

Work on the mill at the Mining Corporation is going ahead at a satisfactory rate, a force of about thirty men being employed. It will require another four or five weeks to complete the alterations, and the mill will then have a capacity for treating about 300 tons of ore daily. An official of the company was asked to-day if the mine would be re-opened immediately after these alterations to the mill may be completed, but it was stated any announcement as to the date of re-opening would be withheld for the time being and when made would be governed by the price of silver at that time. The fact of such extensive changes being made in the mill, with the obvious intention of increasing the efficiency of the plant, is being pointed to in Cobalt as reasonable evidence that the company anticipates an early resumption of production.

Gowganda and Elk Lake.

The hydro-electric power supply is back to normal at the Miller Lake-O'Brien, and operations have undergone an increase during the past week. The arrival of spring has brought with it a better outlook for the whole district, among the smaller properties being opened up appearing the following: The Gowganda Enterprise, McAlpine, Powerful, etc., while others mentioned as likely to resume, being the Saunderson, Silver Star, Hewitt Lake, Silver Bullion, Walsh, Collins and Silverado.

Another consignment of high-grade ore is said to be in course of transportation from the Castle property in the Miller Lake district, to the railhead at Elk Lake.

Exploration work by use of two diamond drills on the White Reserve property at Maple Mountain has been suspended, according to information reaching here. The property has been under option and under exploration by the National Mining Corporation, which concern is represented by J. B. Tyrrell, of Toronto. No official advice has been received as to the cause of the suspension of work.

Ore and Bullion Shipments.

During the week ended April 22nd, two Cobalt companies shipped ore, the Coniagas being the heaviest shipper with two cars to its credit.

Following is a summary:—

Company	Cars	Pounds.
Coniagas	2	131,275
O'Brien	1	64,000
Totals	3	195,275

During the corresponding period, the Nipissing was the only bullion shipper, this company sending out 39 cars containing 50,104,63 fine ounces.

Asbestos by Airplane.

It has been arranged to ship approximately 20 tons of asbestos by airplane from the Rahn Lake property to Elk Lake. The property is near Mount Sinclair, in the township of Montrose, about 35 miles north-west from Elk Lake. The undertaking is looked upon more in the light of an experiment rather than a practical or economical method of transportation. The cost of importing a machine together with an experienced pilot will obviously be such as to discourage the general use of airplanes on such small contracts, but the time occupied, and so on, may prove to be of value in estimating the possibility of aerial transportation where machines and pilots may be retained in regular operation.

THE GOLD MINES.

The Porcupine District.

The Hollinger Consolidated Gold Mines is operating at full capacity for the first time since the completion of its present milling plant. The entire equipment is in use, and during the past week the plant strained a capacity of over 3,200 tons of ore daily. This information was secured officially from Mr. A. P. Brigham, the company's general manager. Mr. Brigham was reticent, however, as to the probable yield, and when asked if the mine were now in a position to make a bid for world leadership, he expressed the opinion that: "it would be best to wait and see". The plant is expected to treat an average of at least 3,300 tons daily, and there is a possibility of attaining a maximum rate of about 3,500 tons of ore daily. Should this prove to be the case, and with the ore running about $10 a ton, it is obvious that the Hollinger is at this moment actually challenging the world's greatest gold-producers for the position of leadership.

During the course of an interview with Major J. Mackintosh Bell, vice-president and managing-director of the Porcupine V. N. T. Mines, the "Journal" correspondent received the information that although the amount of development work done on the property is not very extensive, yet the ore blocked out contains approximately $1,000,000. One very favorable feature is the fact that at the lowest level reached (600 feet deep), the vein on which the shaft is located has a width of 12 feet and contains average values of $11.50 per ton. The company has about 550,000 shares in its treasury, but it is the wish of Mr. Bell to encourage the directors to advance $200,000 with which to re-model the mill and place the mine on a solid basis of production. Of this, $50,000 would be used to bring the mill up to 150 tons daily capacity, and the balance to be used in continuing the main shaft to a depth of 900 feet and establishing three main development levels, one at 600 feet and the others at 750 and 900 feet. "It is my opinion that in the Porcupine V. N. T., we have a mine which is second in importance only to the three leaders the Hollinger, Dome and McIntyre" is a statement made by Mr. Bell.

It was recently stated that the Crown Trust Company had taken up $100,000 of mortgage bonds issued by the Northerown Porcupine Mines, Ltd. This has led to more or less confusion, the statement being in error. The facts of the situation are these: The mortgage bonds of $100,000 were issued as a means of providing funds with which to carry on development work pending the time when the company's mill could be operated, a closing down having been necessary during the winter owing to the shortage of hydro-electric power. Further, the Northerown Porcupine Mines is a consolidation of the Porcupine Crown and the Thompson-Krist properties. The Northerown has an issued capital of 3,000,000 shares of which 2,000,000 are held by the Porcupine Crown and 1,000,000 by the Thompson-Krist. This being so, when the decision was made to issue mortgage bonds of $100,000, it was left to the Northerown to take up 66 2-3 per cent., while the Thompson-Krist was supposed to take up 33 1-3 per cent. It is learned that the Porcupine Crown immediately took up its share, but the Thompson-Krist has not been able to take up its one-third, owing to not having funds available. Accordingly some other arrangement will be required provided the amount of money required exceeds the sum put up by the Porcupine Crown. As regards the Crown Trust Company, this concern is merely acting as trustee for the bondholders. A trust company cannot very well invest its funds in mining property, and the foregoing explanation is intended to set at rest any mis-apprehension which may have been aroused among the shareholders of the Crown Trust Company.

A deal has been closed for the Tommy Burns property, situated in the south-eastern part of the township of Shaw. Arrangements are being made to explore the property by employing diamond drills.

Kirkland Lake District.

About May 1st the cross-cut at the 600-ft level of the Lake Shore is expected to reach a point where the downward continuation of the rich orebody as found at the 400-ft. level is expected to occur. A rich strike was reported during the past week in certain newspapers, but in an interview yesterday with R. C. Coffey, mine manager, the reports were stated to be erroneous. Mr. Coffey expressed the opinion that it was very unfortunate that such reports are given wide circulation without any attempt being made to verify them. Such erroneous reports are entirely contrary to the wish of the Lake Shore Company. Mr. Coffey told the "Journal" that additional grinding equipment had been purchased and, just as soon as it could be installed, would increase the capacity of the mill to 100 tons daily as compared with the present rate of 60 tons a day.

The annual statement of the Argonaut Gold, Ltd., has just been issued for the calendar year 1920. The report shows a production of $32,513.05 as a result of having treated 1,637 tons of ore in its testing plant. The ore taken out of the mine during the year, contained an average of $10.01 in gold per ton, of which $7.01 per ton was recovered by use of the straight amalgamation stamp mill which was used solely for test purposes. It is pointed out that one ore shoot has a length of 200 feet and is six feet in width, containing an average of $15.75 cents a ton. The report states that a new modern mill is proposed and will be erected just as soon as developments justify the work, and at which time the percentage of recovery will be much greater than with the present testing mill. At the 550 ft. level, at which depth high values were indicated by diamond drilling, active development is now under way and the results will be available for the annual meeting which will be held May 11th. The report shows 715,430 treasury shares still unissued and available to finance further work.

GOLD MINES OF NORTHERN ONTARIO NOW PRODUCING AT RATE EQUAL TO ONE-THIRD OF THE TOTAL OUTPUT OF THE UNITED STATES.

(By J. A. McRAE, Cobalt.)

The production of gold from the district of Temiskaming, in Northern Ontario, which embraces the Porcupine and the Kirkland Lake fields, has increased rapidly since the first week in April, and the mines of this district are producing gold at a rate equal to more than 30 per cent of the total current yield of the United States. Moreover, there is every indication that a further increase will take place, and by the end of 1921 the rate of output promises to amount to more than 40 per cent of the total output of the United States.

To deal alone with the mines now producing, these figures comprise a general idea of the current rate of production:

Company.	Daily Tonnage.	Value per Ton.	Daily Output.	Rate Per Year.
Hollinger Con.	3,200	$10.00	$32,000	$11,680,000
Dome Mines	1,400	7·00	9,800	3,577,000
McIntyre-Porcupine	600′	11·00	6,600	2,409,000
Lake Shore	60	25·00	1,500	547,500
Kirkland Lake	140	9·00	1,260	459,900
Teck-Hughes	120	10·00	1,200	438,000
Totals	5,520	.....	52,300	$19,111,400

In addition to the producing mines as of the middle of April, there are a number of other properties on which first-class mills have been built and which will be in operation at an early date. Of these, the Wright-Hargreaves will commence work about May 1st, while the Tough-Oakes will be started up about the last of August. These mines will add the following to the gold production of Northern Ontario:

Company.	Daily Tonnage.	Value Per Ton.	Daily Output.	Rate Per Year.
Wright-Hargreaves	160	$15·00	$2,400	$876,000
*Tough-Oakes	140	15·00	2,100	766,500
Northerown	120	10·00	1,200	438,000
**Schumacher	200	6·00	1,200	438,000
Porcupine V.N.T.	150	10·00	1,500	547,500
Totals	780	.....	$8,400	3,066,000

*Controlled by the Kirkland Lake Proprietary (1919), Ltd.

** Allowing for a proposed increase to 150 tons from the present of 100 tons.

These mines all have substantial ore reserves, ranging from a few hundred thousand dollars in the case of the smaller mines to a high point of over 40 million on the leading mine, the Hollinger Consolidated. The figures presented are not based upon conjecture, but are submitted on the strength of previous achievements and taking into account the per ton of the ore in reserve.

As time goes on, further growth seems probable. There are a number of small mills throughout the district which are not mentioned in the foregoing statement. Also, there is a new mill of 100 tons daily capacity now in course of erection at the Ontario Kirkland mine. The idle mills include a 50-ton mill at the Croesus, 40-ton mill at the Hill Gold Mines, 30-ton mill at the Argonaut and a 30-ton mill on the Canadian Associated Goldfields, a 30-ton mill at the Davidson and a 100-ton mill at the Dome Lake.

Therefore, taking into account the mines already producing at the rate of $19,111,400 and the mills which will be re-opened this summer likely to add $3,066,000, the indicated production from the district of Temiskaming will amount to $22,177,400. In addition to this may be the operation of some of the smaller mills referred to. There is also a probability of a substantial increase in the size of the McIntyre-Porcupine mill, together with the possibilities of the Hollinger and the Dome still further increasing the capacity of their plants above the figures given.

These facts all go to indicate a probable annual yield at the rate of over 22 million and a possible increase to a rate of close to $25,000,000 in 1922. As compared with this, the total production of the whole of the United States in 1920 amounted to only 59 million, and with current statements indicating less than that amount this year.

Another factor which promises to add somewhat to the foregoing figures for Ontario is the exchange rate as between Canada and the United States. Gold commands full value in New York, while the New York funds command a premium of about 12 per cent in Canada. For the time being, therefore, the premium adds this percentage to the net value of the product of the gold mines of this country. This premium may or may not continue for a long time. In any case, the yield of the mines is large, while with the premium the dividends of the producers will be added to the full amount of the premium.

This situation, having in mind the present known mines, holds out great promise for industry in Northern Ontario. Not alone does it assure prosperity during the life of the proven mines, but may reasonably be expected to comprise a drawing card, so to speak, and result in intensified exploration in the vast stretches of promising territory lying on all sides of the proven areas, and, in that way, lead to the discovery and the development of mines quite as good as those which now go to make up this remarkable aggregation of going industries.

Engineers of leading ability express the opinion that only a mere fringe of the gold-bearing territory has so far been developed. This being so, it may not be unreasonable to look to the future not only with hope of further favorable developments, but with a good measure of assurance that gold-mining activity will greatly increase and be accompanied with increased production.

That is the situation as found at present in this part of Northern Ontario, these assertions being based upon actual achievement and entirely conservative opinion, shorn entirely of any attempt to add color and to pyramid hopes based upon mere anticipation.

MONTREAL METAL QUOTATIONS.

Following are fair average prices for ingot metals (in less than car-loads) at Montreal:

	April 21	April 28
Copper, Electro	17	17¼
Copper, Casting	16¾	17
Tin	36	38
Lead	6¼	6½
Zinc	7¼	7¾
Aluminium	34	33
Antimony	7¼	7½

TORONTO MINING STOCK QUOTATIONS.

Quotations on Active Stocks on Standard Stock Exchange for Week Ending April 23rd, 1921.

Silver.	High.	Low.	Last.
Adanac Silver Mines, Ltd.	1½	1½	1½
Bailey	3	3	3
Beaver Consolidated	38	32	36
Coniagas	1.90	1.87	1.87
Crown Reserve	14½	12	14½
Gifford	1⅛	1⅛	1⅛
La Rose	23½	23	23
Mining Corp. of Can.	1.00	1.00	1.00
Nipissing	7.35	6.75	6.90
Ophir	1¼	1¼	1¼
Peterson Lake	6	5¾	6
Temiskaming	22	22	22
Trethewey	15	12	15
Gold.			
Dome Extension	1.00	80½	1.00
Dome Lake	3	2	2
Dome Mines	21.75	22.05	22.90
Gold Reef	1	3½	4
Hollinger Cons.	7.43	6.98	7.12
Hunton Kirkl'd G.M.	12½	10½	11
Keora	16¾	11	16¾
Kirkland Lake	55	17½	54½
Lake Shore M. Ltd.	1.43	1.16	1.36
Kirkland Lake	55	47½	54½
Lake Shore M. Ltd.	1.43	1.16	1.36
McIntyre	2.11	1.91	2.08
Moneta	113¼	113¼	113¼
Newray Mines, Ltd.	6½	6	6½
Porcupine Crown	25½	21	25½
Porcupine V.N.T.	20	16½	19
Preston East Dome	4	3½	3⅞
Schumacher	24½	21	22
Teck-Hughes	18	12	17
Thompson Krist	8	7	7½
West Dome	8¼	7	8
West Tree Mines Ltd.	4	4	4
Oils.			
Ajax Oil	20	20	20
Rockwood Oil, Gas	3	3	3
Vacuum G.	9½	8¾	9

TORONTO COAL PRICES.

Toronto, April 25. —Coal is coming through a little more freely, but there is still a very small movement. Coal dealers in Toronto are advising householders to put in their coal for next Winter, which measure, they say, is necessary for the householder's protection. Anthracite is quoted at $11.36 New York funds for stove and nut, and $11.10 per ton for egg coal. In bituminous coal, smokeless is quoted at from $3 to $3.25 at the mines, with lump about the same and slack $2.00 to $2.25 at the mines, based on New York funds and exclusive of freight charges.

COPPER COMPANIES CURTAILING OUTPUT.

The protracted dull market for copper has forced copper mining companies to greatly decrease production. Most of the large producers have found it impossible to continue operations at even much reduced scales and every week brings announcements of more companies ceasing production. Those that are still operating their mines find it necessary to make big cuts in wages. At the present high costs few of the companies could operate even if the demand for metal were considerably improved.

British Columbia Letter

With the opening of the mining season in those parts of British Columbia which are snow and ice bound for a considerable part of the year the annual exodus from the south of prospectors, miners, and promoters is taking place. To the Peace River, the Atlin, the Cassiar, the Portland Canal and Alice Arm, and to the Yukon Districts, men interested in the business of mining are directing their steps.

The placer-gold possibilities of the Peace and its tributaries have yet to be thoroughly explored. Official reports indicate the possibility of another field and not a few sourdough prospectors are determined to continue the search. In 1908, Wm. Fleet Robertson, provincial mineralogist, on the subject, said: "Among the camps now existing, or formerly operated, situated in and indicating this gold belt, may be mentioned the Klondike—at its northwestern extremity, as far as is yet known, and following in succession, in a southeasterly direction, Atlin, Dease Lake, Omineca, Cariboo, Big Bend and Upper Columbia River—with, at a wider distance apart, in an east and west direction, the camps of Wild Horse Creek in East Kootenay and Granite Creek in the Similkameen." There are wide and practically unprospected areas between some of these points but it is the country drained by the Peace and Finlay Rivers, and particularly the section of the Ingenika River, to which the attention of the gold-seekers is inclined.

Much activity is expected in Atlin if the litigation now hindering the operation of the famous Engineer Mine is cleared up. While placer-mining and hydraulicking on the well-known creeks of this district has been on the decline of late years the possibilities of successful lode-mining have become better appreciated and it is probable that some promising silver, as well as gold, properties will be developed.

Considerable prospecting for placer gold may be expected in the Cassiar District. On Thebert Creek hydraulicking is being undertaken on a large scale with good prospects and it is considered likely that ground held under lease and some not yet taken up, on this Creek, Dease Creek, McDame Creek and other waters of the locality will be inspected by engineers during the season.

Of the Portland Canal District much already has been said but it is significant that the directors of the Premier Mining Company have decided to proceed with the construction of an aerial tramway from their property on Salmon River to tidewater. This will be at least 11 miles in length, one of the longest installations of the kind in America, and a work that will cost about $250,000. This is conclusive proof that the extensive development of the Premier Claims, by diamond-drilling, stripping, tunnelling has convinced the owners that they have an ore body which in extent and in value will well repay this and other heavy preliminary expenditures. It is reported that the Algunican Mining & Development Company has shut down work on the Spider Group, and that the men have filed liens on the property and equipment for the amount of their wages for several months. W. A. Meloche, the enterprising head of this concern, is said to be engaged in the organization of the Northern Light Exploration Syndicate to take over the Northern Light, Spider, Cobalt and Lake and O'Leary properties. If this re-organization is successful the development of the Spider and other claims will be continued. The success of the Premier Mine, however, will serve to sustain confidence in the Camp and there will be a large influx of prospectors and miners this year. In considering the present situation in the Portland Canal area and the future outlook it is well to bear in mind the words of George Clothier, government mining engineer, in his annual preliminary report for 1920. He said: "A great number of properties have been undergoing exploration and development and, though there necessarily have been some disappointments, the percentage of those on which results have been favourable is encouragingly large. As was to be expected, there were many "broker and promoter operators" who incorporated companies last winter on anything with stakes on it, and in the majority of cases there was nothing but the stakes. It is worth noting that the public fought shy of promotions not backed by the report of a competent mining man, and therefore the 'boom' for that kind of mining did not materialize."

Already conditions are reported to be improving at Alice Arm. While no official word has been received yet as to the plans of the Dolly Varden Company there is no doubt that, if the metal market is considered satisfactory, shipments will be resumed. Meanwhile development work will be continued. Prospecting and mining on a small scale will go on in both the regions drained by the Kitsault and the Illiance rivers. In these sections there are many promising silver properties. The Yukon will be busier, according to report, than for some years. Gold dredging is expected to take on a new lease of life as a result of new regulations passed by the Dominion Government for the purpose of facilitating that work. It is the Mayo District, the new silver camp, however, that is expected to do most for the far north from the standpoint of mining. Not only are the properties now in operation to be continued but new locations on Keno Hill, Rambler Hill, Mount Cameron and Lookout Mountain are to be opened up by the Yukon Gold Mining Company and other Companies.

Anyox, B.C.

Notwithstanding the lack of market for copper and the closing down of most of the large producers of America the mine and smelter of the Granby Consolidated Mining & Smelting Company continues in operation. Last December the employees agreed to accept a reduction in wages rather than have the plant closed down and, as a result of the amiable understanding reached between the employed and the employers, it has been possible to maintain the industry. H. S. Munroe, general manager, recently referred to this achievement with satisfaction. He said that wages had been reduced in accordance with a sliding-scale agreement. When the price of copper rose about 14 cents the wages would automatically advance. Living costs for married families he stated had fallen about 25 per cent since December 1st last.

Spences Bridge: B.C.

Gold has been discovered on the old Yale—Cariboo road between Spences Bridge and Asheroft. The find is credited to the Ellingsen Brothers, of Asheroft, who are said to have taken from their claims a number of nuggets. The section already is extensively staked and the original locators are proceeding with development.

Trail, B.C.

The first quarter of 1921 shows ore receipts at the Trail Smelter of the Consolidated Mining & Smelting

The Canadian Miners' Buying Directory.

Acetylene Gas:
Canada Carbide Company, Ltd.
Canadian Fairbanks-Morse.
Preet-O-Lite Co. of Canada, Ltd.

A.C. Units:
MacGovern & Co.
Powley & Townsley, Limited.

Agitators:
The Dorr Co.

Air Hoists:
Canadian Ingersoll-Rand Co., Ltd
Mussens, Limited.

Alloy and Carbon Tool Steel:

H. A. Drury Co., Ltd.
International High Speed Steel Co., Rockaway, .
Peacock Brothers Limited.

Alternators:
MacGovern & Co.

Spielman Agencies, Regd.

Aluminium:

Amalgamators:
Northern Canada Supply Co.
Mine and Smelter Supply Co
Wabi Iron Works.

Antimony:
Canada Metal Co.

Antimonial Lead:
Pennsylvania Smelting Co

Arrester, Locomotive Spark:
Hendrick Manufacturing Co

Assayers' and Chemists' Supplies:
Dominion Engineering & Inspection Co
Lymans, Limited
Mine & Smelter Supply Co.
Pennsylvania Smelting Co.
Stanley, W. F. & Co., Ltd.

Ash Conveyors:
Canadian Link-Belt Company

Ashes Handling Machinery:
Canadian Mead-Morrison Co., Limited
Canadian Link-Belt Co., Ltd.

Assayers and Chemists:
Milton L. Hersey Co., Ltd
Campbell & Deyell
Ledoux & Co.
Thos. Heys & Son
C. L Constant Co.

Asbestos:
Everitt & Co.

Balls:
Canadian Foundries and Forgings, Ltd
Canadian Steel Foundries, Ltd,
Hull Iron & Steel Foundries, Ltd
Fraser & Chalmers of Canada, Ltd
Peacock Brothers Limited.
The Electric Steel & Metals Co.
The Wabi Iron Works.
The Hardinge Conical Mill Co.

Ball Mills:
Hardinge Conical Mill Co.
Hull Iron & Steel Foundries, Ltd
Mine and Smelter Supply Co
Fraser & Chalmers of Canada, Ltd.
The Electric Steel & Metals Co
The Wabi Iron Works.

Balances—Heneeer:
Canadian Fairbanks-Morse Co., Ltd
Mine and Smelter Supply Co

Babbit Metals:
Canada Metal Co.
Canadian Fairbanks-Morse Co., Ltd
Hoyt Metal Co.

Ball Mill Feeders:
Fraser & Chalmers of Canada, Ltd
Hardinge Conical Mill Co
Hull Iron & Steel Foundries, Ltd

Ball Mill Linings:
Hardinge Conical Mill Co
Peacock Brothers, Limited
Hull Iron & Steel Foundries, Ltd

Belting—Leather, Rubber and Cotton:
Canadian Fairbanks-Morse Co., Ltd
Canadian Link-Belt Co., Ltd
The Mine & Smelter Supply Co
Northern Canada Supply Co.
Jones & Glasco.

Belting:
R. T Gilman & Co
Gutta Percha & Rubber, Ltd

Belting—Silent Chain:
Canadian Link-Belt Co., Ltd
Hans Renold of Canada, Limited Montreal, Que
Jones & Glassco (Regd.)

Belting (Transmission):
Goodyear Tire & Rubber Co

Belting (Elevator):
Goodyear Tire & Rubber Co

Belting (Conveyor):
Goodyear Tire & Rubber Co.
Gutta Percha & Rubber, Ltd.

Blasting Batteries and Supplies:
Canadian Ingersoll-Rand Co., Ltd
Mussens, Ltd.
Northern Canada Supply Co.
Canadian Explosives, Ltd.
Giant Powder Co. of Canada, Ltd.
Powley & Townsley, Limited.

Bluestone:
The Consolidated Mining & Smelting Co
The Conlagas Reduction Co., Ltd.

Blowers:
Canadian Fairbanks-Morse Co., Ltd
MacGovern & Co., Inc.
Northern Canada Supply Co.
Fraser & Chalmers of Canada, Ltd.

Boilers:
Northern Canada Supply Co.
Canadian Ingersoll-Rand Co., Ltd
Marsh Engineering Works
MacGovern & Co., Inc.
R. T. Gilman & Co.
Fraser & Chalmers of Canada, Ltd.
The John Inglis Company
Wabi Iron Works.

Blue Vitriol (Conlagas Red):
Canadian Fairbanks-Morse Co., Ltd.

Bortz and Carbons:
Diamond Drill Carbon Co.

Boxes, Cable Junction:
Standard Underground Cable Co. of Canada, Ltd
Northern Electric Co., Ltd.

Brazilian Rough Diamonds:
Diamond Drill Carbon Co.

Brazilian Mica:
Diamond Drill Carbon Co.

Buggies, Mine Car (Steel)
Hendrick Manufacturing Co

Brazilian Balas:
Diamond Drill Carbon Co.

Brazilian Rock Crystal:
Diamond Drill Carbon Co.

Brazilian Tourmalines:
Diamond Drill Carbon Co.

Brazilian Aquamarines:
Diamond Drill Carbon Co.

Bridges—Man Trolley and Rope Operated—Material Handling
Canadian Mead-Morrison Co., Limited

Bronze, Manganese, Perforated and Plain:
Hendrick Manufacturing Co.

Buckets:
Canadian Ingersoll-Rand Co., Ltd
Canadian Mead-Morrison Co., Limited
The Electric Steel & Metals Co
R. T. Gilman & Co.
Hendrick Manufacturing Co
Canadian Link-Belt Co., Ltd.
Marsh Engineering Works
Mussens, Ltd.
MacKinnon Steel Co., Ltd
Northern Canada Supply Co
Fraser & Chalmers of Canada, Ltd
The Wabi Iron Works

Buckets, Elevator:
Canadian Link-Belt Co., Ltd
Hendrick Mfg. Co
Peacock Brothers Limited.

Cable—Aerial and Underground:
Canada Wire & Cable Co.
Northern Canada Supply Co
Standard Underground Cable Co of Canada, Ltd
Peacock Brothers Limited

Cableways:
Canadian Mead-Morrison Co., Limited
Fraser & Chalmers of Canada, Ltd
Mussens, Ltd.
The Wabi Iron Works
R. T Gilman & Co.

Cages:
Canadian Ingersoll-Rand Co., Ltd Montreal, Que
Northern Canada Supply Co
Fraser & Chalmers of Canada, Ltd
The Electric Steel & Metals Co
The Mine & Smelter Supply Co
Mussens, Ltd.
The Wabi Iron Works

Co. aggregating 101,898 tons. This is a figure 35 per cent greater than that for the opening three months of the previous year. Of the total 99,970 tons came from the company properties. It is quite clear, therefore, that the independent operators, affected by the low prices offered for metal, are doing no shipping, although there is considerable development in progress. A shipment of 784 tons is credited to the Blue Bell Mine at Riondel during the month of March.

The recent decision of the directors of the Consolidated Mining & Smelting Company, of Trail B.C., to pass a quarterly dividend and the report of J. J. Warren, the President, read at the meeting held at Montreal, have excited considerable interest in this Province. Mr. Warren showed that the net profits for the twelve months ending December 31st last declined to $291,349 against $1,161,605 in fifteen months covered by the previous statement and $949,245 in the full fiscal 1918 period. He referred to the drop in metal quotations and to high operating costs, including wages, fuel and freight charges, and concluded with the following interesting statement regarding the labour situation:

"With the beginning of the new year wages were cut about 12½ per cent. While many of our workmen have been zealous, much greater efficiency became noticeable as unemployment elsewhere became prevalent and men began to realize the importance of production at low cost. Some materials have fallen in price but powder steel and fuel, main essentials of the company's operations, still remain at or above war prices and freight rates have been reduced but very little."

Victoria, B.C.

British Columbia wants an Iron and Steel Industry. For years far-sighted men have declared that the industrial future of the Province is dependent on the commercial utilization of the magnetite deposits found on the coast and in the interior. They have pointed out from the hustings in political campaigns, from Mining Convention platforms, and through the Press that future industrial development, and the achievement of greater population and prosperity, depends on the establishment of this basic industry. It has been conclusively shown that the iron ore is available in the necessary quantity, that it is of the essential quality, and that the coal measures are at hand needed for the furnishing of the required coke. The Provincial Government has offered a bounty on pig-iron produced in the Province from local ore and also on pig manufactured locally from foreign ore. The same government now has underway a systematic exploration of the iron-ore resources of British Columbia. But the only real sign of action so far is the incorporation of a Company, with headquarters at Vancouver, B.C., and said to be backed by adequate British capital, the objects of which are to inaugurate the desired enterprise. Other British capitalists are said to be interested and to be investigating. But are yet nothing tangible has been done. Now comes the report, apparently well authenticated, that the Northwest Iron and Steel Company, of Spokane Wn., will begin construction of a 25-ton a day electric-iron plant in Stevens County, Washington, close to the boundary of the Province in a few weeks. Fred M. Williams, president of the Company states: "There is no iron-furnace on the coast north of California. The consumption of pig iron on the coast is 500 tons a day. Financiers of the northwest have been giving their attention to the possibility of a steel plant in one of these States or in British Columbia. It is difficult to conceive of any enterprise of more value. Before a steel plant can be established there must be iron furnaces and the first unit of our plant we hope to have in operation this fall. The cost of a steel plant will run into millions but the idea that an iron furnace requires big capital is erroneous. Our first unit, with its equipment, will cost less than $50,000. The important requisite to success is sufficient high-grade iron-ore with ample electric power and a sufficient supply of other material. All these are at hand. We have 300 acres and a ledge 60 feet wide that has been traced 4,500 feet. The ore carries 63 per cent metallic iron. We will use the electric process which makes the finest and purest pig-iron. There are two or three sources from which we will be able to secure ample electric power.

EDITORIAL

THE NORMAN OILFIELD.

Mr. E. M. Kindle, Chief of the Division of Paleontology, has written for the "Journal" of this issue some suggestions to prospectors in the Mackenzie River Valley that he is well qualified to give, as those who heard his enthralling, but modest, description of journeyings in the Northland, given at the Montreal meeting of the Institute, will readily testify.

From the wider viewpoint of the economic value of the Norman oilfield, it is worthy of especial note that Mr. Kindle believes the development of any oil which may be proved to be recoverable can only be recommended as an undertaking for companies prepared to spend very large sums on experimental wells, and in working out a satisfactory scheme for transporting the oil to market.

There can be little doubt, to those who will study the facts given by Mr. Kindle as to the remoteness of the Norman oilfield, the climatic conditions, shortness of working season and the limited hours of daylight that only experienced oil companies, with enormous financial resources and a thorough knowledge of oil transportation, oil technology and markets, can hope to make a commercial success of an oilfield "unique in the difficult commercial problems it presents".

If the Government desires to reap the utmost financial advantage from the Norman field, without relinquishing any of its possessory rights, it appears to be a case for employment of a competent contractor empowered by the Government to develop the presumptive oilfield under the most favourable conditions that it is in the power of the Government—as the holder of all land and mineral rights—to concede. The leasing of a number of scattered points of access to the oil accumulation to a large number of individuals is, we believe, an illogical proceeding. It is generally agreed that a monopoly is synonymous with efficiency, and the only objection to monopolies has been that when they undertook to fix the selling prices of commodities, the efficiency was so pronounced as to make the public uncomfortable. It has never been maintained that monopolies were inefficient in technical operations and, as a case in point, while many people object to Lord Shaughnessy's suggestion of consolidation of the Canadian railways on political grounds, it is fairly generally conceded that greater efficiency in technical operation of the railways would be the result of unified control. So far as the Norman oilfield is concerned, the Canadian Government now possesses all the advantages that proceed from monopoly of possession. Why then should the government dissipate that undoubted advantage by splitting up the unproven oil field into a thousand conflicting operations?

The Canadian Cabinet doubtless realises that quicker, larger and more permanent financial returns from any oil that may be in the Norman district could be obtained by giving a large concession to a large company, but such a step would probably be a most unpopular one. That is not, however, any indication that it would be a bad thing for the country, although admittedly it might be a bad thing for the Government, politically that is.

Those who have observed the progress of industries must admit individual operation has too often resulted in commercial failure, and that the evolution of many large and strong corporations of today has proceeded from the consolidation, as a means of self preservation, of a number of weak and indigent small companies. The tragedy is that the process includes the loss of much money to the original investors, and the eventual payment by the consumer of the successive enhancements of property valuation that consolidations must occasion. Such an evolution must take place in the Norman field if it should be proved that oil obtained there can be brought to market. Why should such an expensive process be regarded as necessary and, what is even more illogical, as being in the nature of right conduct?

THE BRITISH COAL STRIKE

Despatches from Britain regarding the progress of the coal strike are a marvel of reticence. Reading between the lines it is possible to deduce that conditions would be a great deal more serious were it not that the demand is lessened by the cessation of iron and steel making which had virtually caused the present depression before the coal strike was called.

The political nature of the miners' strike has been made clear by the refusal of the Federation to accept any settlement that did not include a national pooling

of profits for the support of indigent districts.

A new kind of pool has been suggested by Mr. Frank Hodges, the Secretary of the Federation. This is, using Mr. Hodges's own words, that the "miners and coal owners (if the coal owners had the coordination and wit within their own ranks) should determine what the price of coal should be, and prevent any owner from selling it at a halfpenny less". Mr. Hodges prefaced this suggestion by saying it was "a dreadful way". It is rather. The ideas of the miners are altogether what the Englishman would call " a bit shocking."

It is significant that in some mining districts the mines have been allowed to flood by forcible restraint of the maintenance forces, whereas in other districts, the miners have been careful to see that no lasting damage is done to mines. The mines that have flooded are chiefly those that suffer from difficult mining conditions, and from partial exhaustion, and are the least likely to be recovered because of the financial disability of the owners. More modern mines have not been allowed to suffer in this way, and it is plain that little sympathy will be forthcoming from the better-disposed miners when the bitter complaint is heard that the opportunity for employment at many mines has been destroyed by the action of those whose livelihood depends thereon. To pump out a good mine is only a matter of time and money, but pumping out a poor mine will not be undertaken readily.

CONSOLIDATED SMELTING COMPANY'S 1920 REPORT.

The report of the directors of the Consolidated Mining & Smelting Company to the shareholders, signed by the president, Mr. James J. Warren, is a frank statement of adverse factors beyond the control of the management. Inventories, that pitfall of recent years, were written down by $624,000, to meet the fall in metal prices. The fall in prices on the monthly production of the Company represented a drop in income, as between August and December of 1920, of over $300,000 per month. Despite this drastic diminution of revenue the Company had to pay higher prices for fuel, and an increase in freight rates that affects the net earnings to the extent of $40,000 per month. In face of such occurrences, the president does not over-state the facts, in the light of the balance-sheet, in reporting that the staff of the company "met the unexpected and almost baffling developments of the year with courage and resourcefulness".

The workmen of the Company have suffered a wage reduction of 12½ per cent, and credit is given to them for increased efficiency under the difficult conditions prevailing.

The report mentions important discoveries of ore in the Sullivan Mine, and it is stated as most important that diamond drilling on the bottom level of the mine has cut the high-grade lead-ore body, which was so profitable in the upper levels, at a point 8,700 feet from the portal of the lower tunnel. While further development of the Sunloch and Coast Copper properties has been suspended until the copper market improves, it is stated these properties promise to provide a very large tonnage of copper-ore high enough in grade for profitable results under normal conditions of metal prices.

Mr. Warren states that current market-prices of metals are below the cost of production of most producers, which can only be a temporary condition. There can be but little doubt of the accuracy of this forecast so far as the base metals are concerned. Although prediction of the course of the silver market is quite impossible, it being largely a reflection of crop conditions and political affairs in the Orient, the tendency of the base-metal markets is noticeably stiffened within the past few days, as must naturally be the case following the extended and prolonged curtailment of production that has taken place since the Autumn of 1920.

The report of the general manager, Mr. S. G. Blaylock, states that metallurgical processes have made great strides during the year, and mentions that the concentrator is now capable of handling 900 tons of Sullivan ore per day, "with results very much ahead of anything thought possible last year, and with the certainty of still further improvement".

So far as it is possible to judge from written reports, and without actual knowledge of the operations reviewed, the shareholders of the Consolidated Company should be satisfied with what is evidently a record of efficient management and all-round good team-work during an unprecedentedly difficult period.

PROPOSED GOVERNMENT CEMENT PLANT IN ONTARIO.

The Government of Ontario proposes the establishment of a cement plant. There is no known reason why a government can hope to make cement more cheaply than the ordinary industrial corporation, and there are many reasons—all too apparent at this time—to believe that government operation of a manufacturing industry will result in a greater unit cost for material delivered. The chief reason for high prices of cement in recent years has been the increased cost of coal. Indeed the chief reason for most high manufacturing costs is attributable to fuel costs at the point of ultimate delivery. The cost at the pitmouth is one of the least of the factors in this delivered price. The Government of Ontario would be much better employed in looking after the coal supply of the Province, and the eventual cost of cement to the taxpayers of Ontario will be smaller if the office of Fuel Controller is revived, and the proposal to erect a government cement factory is killed.

MACKENZIE RIVER BASIN MEMOIR.

Attenton is called to the issue by the Department of Mines at Ottawa of a revised edition of Messrs. Camsell's and Malcolm's report on the Mackenzie River Basin. A note on the contents of this memoir will be found elsewhere in this issue. It contains an excellent map, showing geological formations where they have been determined. The Survey is to be highly congratulated in being able to issue such complete information for public use at short notice.

CORRESPONDENCE.

Pan Extension Gold Mine.

The Canadian Mining Journal,
Gardenvale, Que.

Dear Sirs:

Having read your editorial in your journal regarding the Pan Extension Gold Mining Company, I think that you have misrepresented and exaggerated it to a great extent. For instance, you say that there has been 40,000,000 shares sold by different companies, and that the general public are being defranded out of their money. If the truth was known, not half of that amount has been sold, and I doubt very much if all the stock that has been sold or controlled by all the different companies since Rice Lake District became known, would total 40,000,000.

You also say that this stock is being put on the market by Americans. I would like to know who these parties are, as I only know of two. I would be pleased if you would supply me with the name of the party who you say is developing a claim in Rice Lake, and who is supplying you with all the information. Furthermore, I wish to say that the Pan Extension Gold Mining Company is the only gold mining company who have been really developing their property in Rice Lake. It appears to me that your editorial is written more from a prejudiced standpoint than for real information, also the essays which have been given by the Pan Extension Gold Mining Company to the general public, are absolutely true and correct. We would advise you to write to Ottawa for information regarding this matter.

Yours truly,
W. A. Morden,
Sec. of the Marigold Gold Mining Co.

Note: The opinions expressed in recent issues of the "Journal" on the financing of mine prospects in Northern Manitoba were made advisedly, and were chiefly based on the reports of officers of the Government of Manitoba and of the Canadian Geological Survey. The only statement contained in Mr. Morden's letter that is pertinent to the comment made by the "Journal" is that "the Pan Extension Gold Mining Company is the only gold mining company who have been developing their property in Rice Lake". If, under such circumstances, stock has been issued on Rice Lake properties amounting to forty million dollars in face value, or only half that amount, does it not look as if the general public had been handed a lemon? We do not doubt that the assay values of samples from the Gold Pan Extension Mine may be correctly quoted, but this does not justify a belief that Pan Extension "will stand supreme as the richest gold mine in the World", that it contains "chambers of gold", that it will rival Cripple Creek and Kalgoorlie, and that "there is every assurance that the deeper development will block out millions of dollars of this extraordinary high grade ore". The point we have endeavored to make is that the promotion literature emanating from Winnipeg has advertised prospects as though they were developed mines of proved richness. The extraordinary clause in the subscription blank, assuming personal liability and releasing the selling agents of Pan Extension shares from responsibility for the statements made (see page 246 our issue of April 1st) strengthen our conviction that purchase of Pan Extension shares is a very ordinary gamble. Mr. Morden's letter does not remove that impression. — Editor.

SALE OF ATIKOKAN BLAST FURNACE AT PORT ARTHUR, ONT.

J. J. O'CONNOR.

News of the sale of the Atikokan Iron Company's blast furnace, at Port Arthur, has been received with the greatest satisfaction. It has long been felt that the fact of this furnace lying idle has been one of the greatest handicaps the iron-ore resources of Northern Ontario had to contend with in interesting capital in their development.

Now that this furnace is to be put in blast, the operation of local iron-deposits is assured, and the building up of a permanent iron-ore and pig-iron industry, together with all the collateral lines of endeavour that naturally follow such an industry, are within the grasp of this community.

Mr. J. Dix Fraser, Superintendent of the Atikokan Iron Company, arrived here on the 16th, accompanied by John E. Hogan, of Chicago. They met the Finance Committee of the City Council on the 18th, and laid the proposed agreement of sale before that body, asking for ratification thereof by the City Council. In a special session of the City Council held on the 19th, called for this purpose, a resolution of the Finance Committee recommending the sale of the Atikokan Iron Company's blast furnace at Port Arthur, was duly ratified, the consent of the City of Port Arthur being necessary owing to the fact that the City has a substantial monetary interest in the property.

The name of the purchasers of the blast furnace is withheld for financial reasons, for the present. Mayor Matthews is in possession of this information, and is eminently well satisfied with their bonafides, financial strength, and experience to carry out such an undertaking.

The new undertaking involves the development of iron ore deposits in Minnesota, adjacent to the International boundary, the construction of a few miles of railway to connect with Port Arthur, Duluth & Western Division of the Canadian National Railway, at, or near Gunflint Lake, and the heavy placing of this division in a condition to accommodate heavy traffic. Mr. Hogan has left for Toronto to consult with Mr. D. B. Hanna, President of the Canadian National Railways, pursuant to the carrying out of the necessary connections and betterments.

It is the intention of the City Council to submit a By-Law to the electors in the near future, to fix the assessment of the blast furnace under an agreement for a fixed number of years.

Suggestions to Oil Prospectors in the Mackenzie River Valley*

By E. M. KINDLE, Geological Survey of Canada.

Unless all signs fail, the opening of navigation in the Mackenzie river basin this season will witness a northern migration of oil prospectors, unprecedented in western Canada. A large proportion of those who are likely to make the long journey to the new oil-field below Norman on the lower Mackenzie will probably have little or no knowledge of the conditions under which they must live in this region. (See map, Figure 1). A few suggestions and some bits of geographical information from one who has spent two seasons in the Mackenzie valley will perhaps be helpful to many who go into the great Northland for the first time.

It may be well to remind prospectors who go into the Mackenzie valley expecting to spend a year or more, that while they will find a genial summer climate, they will need to provide with some care for the sub-Arctic winter conditions which follow the seductive smiling northern summers. One of the most important of these provisions for Winter is a cabin (Figure 2). It should be clearly understood that there are no road houses or other establishments furnishing public accommodation anywhere in the Mackenzie valley.

The environment of the North exercises a selective influence on the human as it does on the other kinds of animals found within its bounds. The man who lives in the North as a trapper must in winter be able to visit his traps and sleep in the open at a temperature of 60 below. Losing a trail in the spruce forests (Figure 3), is likely to mean freezing in Winter and starvation in Summer. He must have a keen sense of direction and the ability to estimate accurately the limitations of his canoe. An error in estimating the hazard of a rapid or the strength of a gale results in

* Published by permission of the Director of the Canadian Geological Survey.

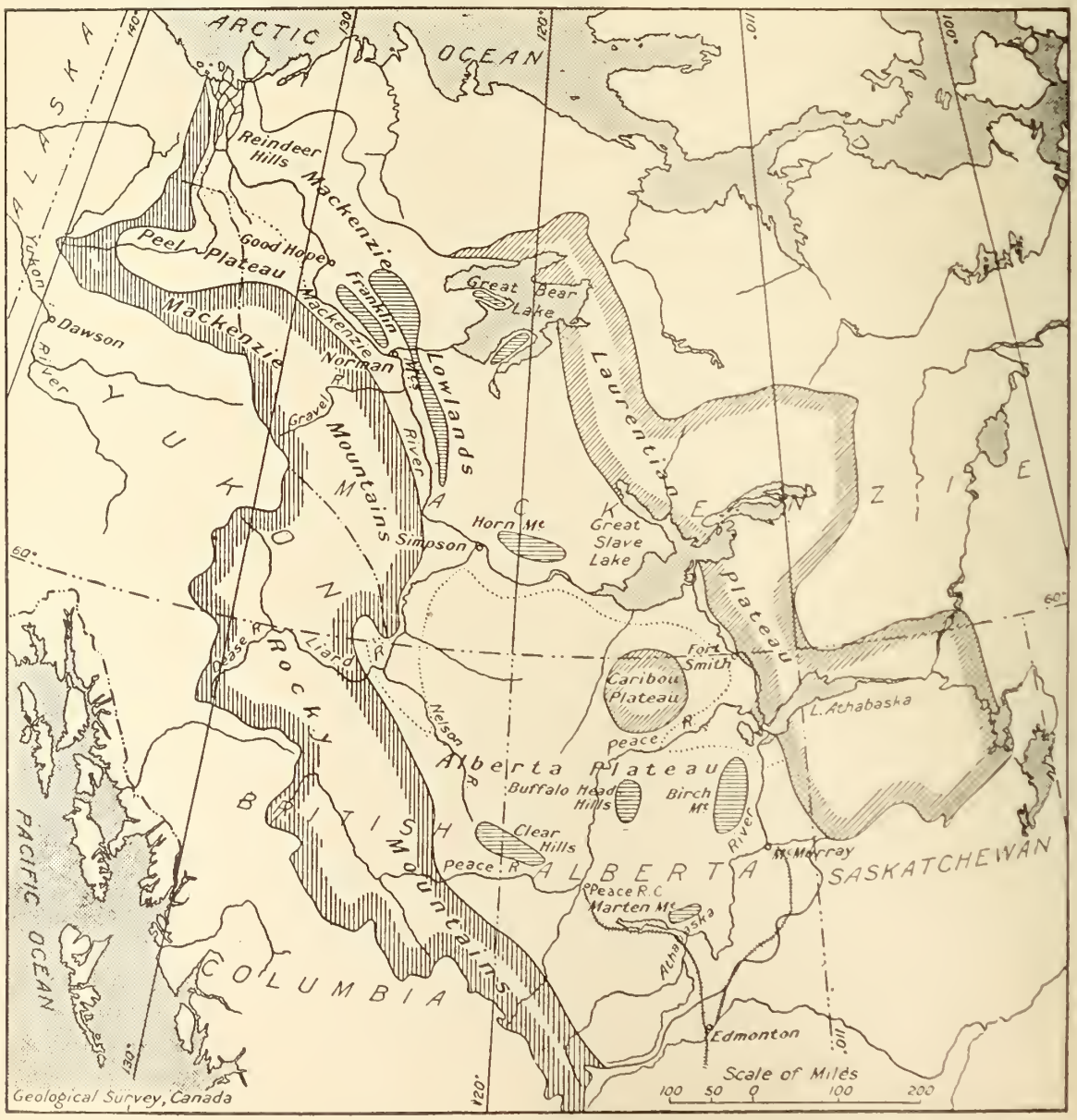


Fig. 1.—Diagrammatic Map of the Physiography of the Mackenzie River Basin. (After Camsell and Malcolm).

his elimination from the field of adjustment to northern conditions. So the white men whom one meets on the northern rivers and lakes represent as a rule a selected group of men who have proven themselves fit to cope with conditions which quickly weed out the human weaklings.

Outfitting.

Edmonton is the logical place for outfitting if one wishes the advantages of large and well-stocked stores, but most of the provisions required for an expedition into the N. W. Territories can be obtained either at Peace River Crossing, or McMurray. At one or the other of these points the north-bound traveler takes final leave of railways and hotels and must be prepared to depend entirely on his own resources. After provisions the next most important items for the outfit are one or two heavy woollen blankets or some form of sleeping-bag and a mosquito-proof tent. No experienced man will neglect the latter and the nearly equally important items of light-canvas gloves and head nets in outfitting for any part of the northern wilderness. He who does neglect these precautions against the universal mosquito pest of the Northwest will have good cause to regret his negligence and probably decide that he would have enjoyed just as much a sojourn in the super-heated climate of tradition.

One of the things which should be included in the outfit of the prospector going into the Mackenzie basin is a geological map of the region. This may be obtained by writing the Director of the Canadian Geological Survey at Ottawa for a copy of Memoir 108. Another small but important item of the outfit is a pocket compass. The northbound traveler may be reminded here that his compass readings require correction as he journeys north in somewhat the same way as does his watch on a transcontinental trip. At Ft. Smith the needle points not even approximately north but 33° 23′ east of north. At Ft. Norman the declination east is between 41 and 42 degrees.

Transportation.

Any approach by rail to the Peace or Athabasca rivers, which are the great waterways leading toward Great Slave and the Mackenzie, must be through the city of Edmonton. This thriving modern city was a very few years ago only an obscure trading-post of the Hudson Bay Co. on the Saskatchewan River. A railroad was completed a few years ago from Edmonton to Peace River Crossing on the Peace River, which is about 312 miles northwest of Edmonton. Another railroad extends north from Edmonton via Lac La Biche to the head of navigation on the Clearwater River (Fig. 1). This railway ends near McMurray; from that point to the Arctic coast steamer navigation on the Mackenzie is interrupted at but one point, the rapids at Fort Smith, where there is a portage of 16 miles. It should be noted however that while the latter route is the most direct the service beyond Lac La Biche is frequently discontinued for considerable periods because of the condition of the road bed. The Peace River route is longer and involves a fourmile portage at the Vermilion chutes which the McMurray route avoids, but the railway transportation is more dependable. The distance from the end of the railroad at Peace River Crossing to the oil well is about 1500 miles, and from McMurray about 1200 miles. Telegraph service extends to Peace River Crossing and to McMurray but not beyond

Fig. 2.—A Trapper's Cabin, Mackenzie River Valley.

Fig. 3—Spruce Forest on Slave River.

Fig. 4.—A Mackenzie River Steamer opposite Norman.

Fig. 5.—Canoeing on the Slave.

Two lines of steamers have for a number of years been engaged every Summer in bringing out the winter catch of fur and taking in the yearly consignment of supplies to the trading posts which are located from 100 to 200 miles apart throughout the Mackenzie river system. (Figure 4.) A third line began operations in 1919. These steamers make only a single round-trip to the most northerly posts. Two or more trips are ordinarily made to points on the upper Mackenzie. The companies operating steamers on the Mackenzie in 1920 were the Hudson's Bay Company and Northern Trading Co. Ltd. Both of these companies have offices in Edmonton.

The round-trip steamer rate quoted by one of the transportation companies this season from Ft. McMurray to the oil well, including meals and berth, is $300. A freight rate which has been quoted between these points (north) is $10.25 per hundred.

During the winter season the only communication between the Mackenzie Valley and the outside world is maintained by dog sledges or carioles which carry the mails in and out of the Mackenzie Valley once a month. Only first-class mail, however, is carried on these.

Fig. 6.—Trapper's Boat with a Year's Outfit.

It may well be understood that to the inhabitants of the Mackenzie Valley the great seasonal events of the year are the opening and closing of navigation on the waterways of the basin.

The ice of Great Slave Lake blocks the navigation of the Mackenzie River for nearly a month after the great river is free of ice. Owing to this fact navigation on the Mackenzie is limited to about three and one-half months. The record of the ice break-up at Rae on Great Slave Lake entered in the Hudson's Bay Company journals and published by Russell shows the break-up during 6 years (1857-1859 and 1883-1885) to have ranged from May 30 to June 23. The general direction of the wind in spring, however, drives the ice toward the southern shore so that steamers seldom venture into the lake before the first of July.

The Mackenzie at Simpson, which is near latitude 62°, opens between May 4 to May 20, averaging from the 10th to the 15th, according to Captain Mills, who has spent several years at Simpson and has run steamers on all of the navigable waters of the Mackenzie basin. Because of nearly dead water in the Mackenzie for a long distance, the head of the river opens two-and-a-half or three weeks later than at Simpson. The opening of Great Slave Lake generally occurs, according to Captain Mills, between June 16 and July 2, or six weeks later than the Mackenzie below Simpson.

Fur constitutes the sole commercial product of the country, and prospective travelers in the Mackenzie valley may be reminded that the transportation companies were established solely for the purpose of getting the fur out of the country, and a limited amount of provisions in each season to the trading posts, not for the accommodation of the traveling public.

The approximate distances between the trading posts on the Mackenzie river system north of the end of the railroad at McMurray are indicated in the following table:—

Fort McMurray to	Fort Chipewyan	190 miles
" "	Fort Fitzgerald	280 "
" "	Fort Smith	296 "
" "	Fort Resolution	490 "
" "	Fort Hay River	570 "
" "	Fort Providence	660 "
" "	Fort Simpson	835 "
" "	Fort Wrigley	995 "
" "	Fort Norman	1155 "
" "	Oil Well	1201 "
" "	Fort Good Hope	1330 "
" "	Fort Arctic Red River	1570 "
" "	Fort McPherson	1635 "
" "	Fort Seenie	1735 "

A company has been organized which proposes to build a railway around the Slave river rapids between Fort Smith and Fitzgerald. At present however all freight must be transported across the 16 miles between these two points by wagon or tractor.

Steamers will leave Fort Smith for the first trip down the Mackenzie about June 24. Departure from the same point on the second trip will be about July 26.

The Mounted Police have the authority to turn back any individual whom they consider for physical or other reason unfit for the trip. The inspector at Fort Fitzgerald, which must be passed by all persons entering the Mackenzie Valley, is required to take certain personal information regarding each individual going beyond that point. This interview may include a request for evidence that arrangements have been made with some power-boat for return transportation or that a contract for a year's supply of provisions has been secured.

It is necessary to begin the return trip from Norman not later than September 28th if a winter sojourn is not planned.

It is reported that aeroplane service to the new oil district will be available for those who do not mind paying $1000 for the round-trip. The Imperial Oil Company is preparing to use planes for the purpose of taking in its own employees.

Canoe Travel.

It is very probable that many persons wishing to go north this season will find it impossible to secure accommodations on the steamers. Such persons will however, find it possible to make the trip north by canoe, and to make very good time with the aid of the river current. (Figure 5). The return trip of course cannot profitably be made in this way since the journey is up stream. A man skilful with tools can build his own boat on the river bank at Peace River Crossing. (Figure 6).

In the northern latitude where daylight lasts about 24 hours in June it is feasible for large canoes to travel day and night if the party wishes to speed up. The mosquitoes are less active during the cool nights which

is often another incentive to night travel. The writer has covered the 200 miles stretch between Fort Smith and Resolution by day and night travel in 2½ days. This method for short periods involves no hardship, if the night is divided into two or more watches with only one man at the paddle, while the others sleep or study astronomy from the bottom of the canoe.

The northern rivers disclose only half their charms to the man who knows them only in the bright forenoon and afternoon sunlight. It is after the long-delayed sunset that the great, gloomy, unexplored spruce-forests assume their air of greatest mystery and fascination. The dark-green tops of the tall, slender spruce trees are apt to be first outlined sharply against a rose-tinted northwestern sky. This may fade to various shades of purple, green or gray, but not into the darkness of southern latitudes. At midnight there is plenty of light for safe canoeing but not enough to be sure whether a dark object on the bank a few hundred yards

Fig. 7.—Vermillion Rapids, Peace River.

away is a moose, a bear or only a black stump. Frequently the canoeman will see in the dim light near the shore a huge finger-like apparition waving furiously in the strong current and pointing downstream as if some river god were pointing the way and admonishing the voyageur not to tarry in his kingdom. An occasional booming splash breaks the midnight stillness as some stately spruce undercut by the river drops into the stream with a portion of the bank. If the mass of earth and stones on the roots is large they may anchor it on the river bottom and after the spring break up of the ice has stripped off its branches it may become one of the weird looking vibrating finger boards. The quiet solemnity of the night is sometimes broken by bird notes.

The approach of sunrise, which comes in June about 2 o'clock on the Slave, brings with it not only a feast of color for the eye in the northeastern sky, but a rich blending of odors which at sunset gave no evidence of their existence.

There are only two points on the entire Mackenzie river where the canoeman needs any special advice in regard to avoiding rapids. One of these is opposite the site of Old Fort Wrigley. Here the river splits on a rocky island. Loaded canoes and scows should take the west channel. The narrow eastern channel is rather swift water. The other locality is the Sans Sault rapids. Here also the canoeman should take the west side of the river keeping near the shore. The Vermillion chutes, (Figure 7) and the Smith rapids on the Slave are always portaged.

Geographical Features.

The Mackenzie basin embraces a vast area representing some 680,000 square miles of territory in Northwestern Canada. Extending over nearly 17 degrees of latitude it necessarily includes a considerable variety of physiography. A great central plain bordered on the east by the Laurentian plateau and on the west by the Rocky mountains and their northern extension, the Mackenzie Mountains represent the major physiographic features of the region. The mileage of the new oil well is equivalent to the distance from Ottawa to South Florida. Since there are no roads and very few trails, travel in the Mackenzie valley is strictly limited to the waterways. Everywhere dense forests of spruce and poplar, muskeg or small lakes cover the lowlands near the rivers. These generally render travel across country nearly impossible or extremely slow.

In all the 1200 mile stretch of lake and river between the end of steel at McMurray and the oil-well, the traveler will see only eight or ten Indian villages (Figures 8 and 9) with two or three fur-trading stores (Figure 10) at each to interrupt the virgin forest. The total population of the entire Mackenzie district will probably not exceed 5000. Probably less than 150 of these are whites, the remainder being Indians, except 200 or 300 Esquimaux.

Anglican or Roman Catholic Missions are maintained at most of these villages.

The Royal Canadian Mounted Police is represented by about a dozen non-commissioned officers and men distributed throughout the Mackenzie valley.

The Mackenzie river trip includes a wide variety of scenery. Anyone who can feel the pull of the great Northland, and who wishes to see what lies beyond the northern outposts of civilization, can hardly fail to enjoy a summer trip to the lower Mackenzie, provided he does not expect the kind of accommodations provided on the St. Lawrence or Hudson river boats.

Two government Indian agents, who are also mining recorders, reside in the district. Gerald Card is the agent at Fort Smith and T. W. Harris at Simpson. Both of these gentlemen perform various other official duties and still find time to extend the most kindly hospitality to the geologists who pass their posts. It may be added that dispensing hospitality in the most generous way is a characteristic of nearly all the white men the writer has met in the Northern trading-posts.

Agricultural development is limited to the gardens of the fur-trading posts located about 160 miles apart, along the Mackenzie. These gardens, however, demonstrate that potatoes and various other vegetables can be grown successfully as far north as the Arctic Circle.

Large game is rather scarce near the Mackenzie, but excellent white fish and inconnu are abundant both in Great Slave lake and the Mackenzie. Fish constitute the principal source of food supply for the Indians.

Fig. 8.—Indian Feast and Cabins at Fort Norman.

Oil Development.

The tar springs of the Athabasca region were noted as early as 1789 by Sir Alexander Mackenzie in the "Voyages through North America to the Frozen and Pacific Oceans." The first report of the Canadian Geological Survey on the Mackenzie river valley by McConnell published in 1890 described the oil prospects of the region. His report states that "The Devonian rocks throughout the Mackenzie valley are nearly everywhere more or less petroliferous, and over large areas afford promising indications of the presence of oil in workable quantities. The rock is in several places around the western arm of Great Slave lake highly charged with bituminous matter and on the north shore tar exudes from the surface and forms springs and pools at several points."*

Nearly every geologist who has since visited the region has commented on the oil seepages found in certain areas. The discovery of oil in the Mackenzie valley is therefore not a new thing.

The first attempt to exploit the oil of the Mackenzie valley was made during the summer of 1920 by the

*R. G. McConnell, An Exploration in the Yukon and Mackenzie Basins, N.W.T., Can. Geol. Surv. Ann. Rept., New Series, Vol. IV., part D, 1888-89 (1890) p. 31.

Fig. 9.—Indian Camp on the Peace River.

Fig. 10.—Hudson Bay Co. Store at Ft. Norman.

Imperial Oil company. The results secured from their well, which is located 45 miles below Norman on the bank of the Mackenzie, is reported to have been announced by C. O. Stillman, president of the Imperial Oil Ltd., as follows:—

"On August 25, at a depth of 783 ft., oil was encountered, which flowed out of the 6-in. pipe for thirty minutes, when the well was capped and shut in. Any estimate as to the amount of oil this well would produce is only a guess, as there was no tankage available, and an accurate test could not be made."

Various other far less conservative statements have also reached the public, but these are seldom if ever accompanied by any hint regarding the difficult commercial and physical problems which have yet to be solved before the Mackenzie river oil can be utilized.

The success of this first well is likely to lead to undue confidence on the part of oil prospectors in the commercial results which may be expected. It does not mean that Mackenzie river oil can be marketed at any early date. The 1200 miles which separates the new oil well from the end of the nearest railway presents a transportation problem of very great magnitude. Its solution is not likely to be attempted until numerous wells have demonstrated the existence of a large and very rich field. The existence of an oil field which will justify the huge outlay required to build a pipe line or work out any other adequate scheme of transportation has not yet been proven. It is evident that this Norman oil field, however rich it may prove to be, is unique in the difficult commercial problems which it presents. Its proximity to the Arctic Zone, short working season, and great distance from centers of population, present obstacles which the prospector with limited capital will do well to consider carefully. At present the development of this oil can only be recommended to companies which are prepared to spend very large sums on experimental wells and in working out a satisfactory scheme for transporting the oil to market.

MACKENZIE RIVER BASIN.

Revised Geological Survey Memoir.

A revised edition of the report by Charles Camsell and Wyatt Malcolm on the Mackenzie River basin has just been published. Descriptions are given of the waterways, transportation facilities, climatic conditions, and commercial possibilities.

The Mackenzie basin, covering as it does some 680,000 square miles of territory in northwestern Canada, necessarily embraces a great variety of topographic forms. Its longer axis, about 1,350 miles in length, conforms in its direction to the trend of the main physiographic features and strikes northwestward. In width it ranges from 300 miles at the mouth of the river to 900 miles near the centre of the basin.

It includes within these boundaries three main physiographic provinces, each of which runs almost the whole length of the basin and has characteristics which sharply distinguish it from the adjacent provinces. The three provinces are; a rugged, mountainous highland on the west, known as the Cordilleran region which is a continuation of the mountainous region that forms the backbone of the North American continent; a relatively more subdued, but rocky, and partly treeless plateau in the east known as the Laurentian plateau and which is part of the great plateau that almost encircles Hudson Bay; and between these two a broad, almost level, forested plain through which the trunk stream flows northwestward to the Arctic ocean. The last is the northward continuation of the Great Central plain of North America.

The plain is underlain by sediments of Devonian and Cretaceous age and to a smaller extent by Silurian and Tertiary sediments.

From the point of view of oil possibilities the Devonian and Cretaceous formations are the most important. There are several known oil seepages from the Devonian rocks and the boring by the Imperial Oil Company on the Mackenzie 45 miles below Norman, in which a strong flow of oil was struck, was made in sediments of this age. The oil struck in wells on Peace river occurrs in sandstones of Cretaceous age. The bituminous sands of Athabaska river are also of Cretaceous age.

Sediments of Devonian age concealed in places by Cretaceous and Tertiary rocks, extend from near the Mackenzie delta southward to beyond lake Athabaska, a distance of a thousand miles. These sediments are divisible into two series; the upper consists mainly of shale and is of Upper Devonian age; the lower consists mainly of limestone and is of Middle Devonian age.

The Middle Devonian rocks are exposed in a broad belt on the north and south shores of Great Slave lake, in the mountains lying to the east and west of the Mackenzie, and in the ridges crossing the Mackenzie near the mouth of Carcajou river, and elsewhere. It is from the Middle Devonian rocks that the oil seepages of Windy point and near Fort Good Hope issue.

The Devonian sediments exposed on the lower Peace river, Hay river, Liard river and throughout the greater length of the Mackenzie belong to the upper series and in all probability rest upon the Lower Devonian rocks throughout the greater part of the area. The boring made 45 miles below Norman starts in sediments of Upper Devonian age.

Details of structure have not been worked out. Anticlinal folds are common and enter into the structure of such features as the Rock-by-the river-side and the several ridges trending east and west near the mouth of Carcajou river. The structural features of Franklin and Bear mountains conform in a general way to the trend of Mackenzie mountains and it is not improbable that local undulations occur in the intervening broad valley through which the Mackenzie flows.

The discovery of oil below Norman is regarded as an event of great importance. It has aroused world wide interest and will lead to a more careful investigation of the possibilities of this little known part of Canada.

The report, which is accompanied by a geological map on a scale of 50 miles to 1 inch, may be had from the Geological Survey Ottawa.

SCOTIA COAL OUTPUT IN APRIL

The production of the Nova Scotia Steel & Coal Company's collieries for April was 31,718 tons which compares with 51,377 tons in April 1920. During the month the Scotia Colliery has not worked, and the Jubilee Colliery has been largely idle. The production for the first four months of the year totals 181,870 tons, comparing with 208,695 tons in the corresponding period of 1920.

Canada's Coal Problem

(A Further Study).*

By F. W. GRAY.

At the Annual Meeting a year ago, the writer read a paper on "Canada's Coal Supply," and at the Winnipeg meeting in October followed up this paper by adducing the later statistics of production and supply then available, and emphasising the quite obvious importance of the Western coalfield to Canada, arising from the concentration of 99·3 per cent of our coal reserves west of the Souris lignite beds.

In the events of the year that has intervened there has been much to encourage those who urge that the problem of Canada's coal supply should be viewed first from the standpoint of national independence and defence, and that apparent commercial standards should be relegated to their proper position of lesser importance. The word "apparent" is designedly chosen. The cost of coal to Canada has for some time been largely determined by the purchasing power of our paper dollar, and this is, in its turn, largely set by the ratio between the coal we produce and the coal we import, so that, paradoxical as it may seem, apparent cheapness from the individual viewpoint may be the rankest prodigality from a national viewpoint.

The domestic production of coal during 1920 was the largest in our history and this is a matter for unreserved congratulation. As compared with 1919, we found 2½ million tons of coal, the equivalent of a $25,000,000 gold shipment to New York in support of national solvency.

Nevertheless the 1920 production was 5 million tons below the production capacity of the existing coal mines, a quantity that applied to domestic requirements would have been equivalent to a further gold shipment to New York of not less than $50,000,000, ignoring the stimulus to our internal economy that would have proceeded from the mining of this coal at home.

The output capacity of existing collieries is, however, by no means the capacity of domestic coalfields situated within proved economically-possible transportation distances of home markets.

The maximum possible production of the existing coal mines of Nova Scotia and New Brunswick has, for the purposes of the foregoing calculations, been placed at 8 million tons per annum, but there is no insuperable difficulty in raising this production—given time and expenditure — to 10 million tons. Such a production would make the Maritime Provinces and Newfoundland, Quebec as a whole, and a considerable area of Ontario completely independent of extra-national sources of supply. In making this statement, it is of course contended that anthracite is not a necessary import in any Canadian territory within economically-possible transportation distance of domestic bituminous-coal mines.

The production of the Western coalfield is anything that Canadian opinion and support likes to make it. There is no limit fixed by the availability of coal, either in regard to quality or quantity.

The gap—the apparently unfillable gap, under existing conditions of transport facilities—is Ontario. Even Ontario could be made accessible to Nova Scotia coal by a deep water-way from the sea to the Great Lakes, and in all probability will so be made accessible by a succeeding generation.

For the present, therefore, Ontario must look to the United States for coal, and, in recent years, Ontario could not look elsewhere for coal seeing that even in those Canadian provinces plentifully supplied with coal, or situated within reach of the coalfields, the consumption exceeded the domestic production.

It is a proper thing that Ontario should import coal, because it is a necessary thing, but is is submitted that it is an improper thing from a national standpoint that the other provinces should import coal from extra-national sources, because it is unnecessary.

Two recent newspaper despatches may be quoted as instancing typical viewpoints that are based on error and are subversive of national interests.

One despatch from Ottawa, dated 18th January, states "That the danger of a coal famine in Canada this winter, has been entirely removed, unless something should happen to interrupt importations of hard and soft coal from across the United States border, is the view expressed today by the Dominion authorities."

A second despatch, from Washington, quotes a U. S. Senator, speaking in a debate on a bill that proposes the raising of a higher tariff wall against Canadian goods in the United States, as remarking: "Canada, as she has always done, will continue to buy where she can buy cheapest, and if she can buy cheapest in the United States, she will continue to buy from us."

The impression given by the Ottawa despatch is that it reflects a resignation in official circles to continued dependence upon the United States for coal, and this can only be based upon an unfortunate disbelief in the possibility of independence.

The jibe of the U. S. Senator galls deep because it is true. That cheapness does not altogether consist in a relatively smaller outlay of money is not any less true.

These instances are quoted because they reflect a widespread opinion, that it is the duty of the Institute to inform and correct.

The foregoing review about sums up the existing situation, which the writer submits is unsatisfactory in the following particulars:

a. Coal output in Canada is disproportionately small in regard to the extent of the domestic coal reserves.

b. The domestic output has not kept pace with the population of the country, and the growing consumption of coal per capita.

c. That while some dependency on the United States for coal is inescapable, there is no good reason for the annually increasing dependency of recent years.

d. That there does not yet exist a unified public opinion in Canada that will demand the use of domestic mined coal to the maximum point of substitution for imported coal.

Before considering possible remedies, the following facts regarding the relative coal resources of Canada are submitted, not as anything novel, but as bearing on

* A paper presented at the Annual Meeting of the Canadian Institute of Mining and Metallurgy, Montreal, March, 1921.

the question at issue.

The coal beds of Canada, with a content estimated at 1¼ thousand billion tons, are about equal to those of the whole of Asia.

Canada has 17 percent of the world's coal reserves, and 71 per cent of the reserves of the British Empire.

With a consumption per capita that will ultimately exceed that of less northerly countries, Canada has a production of 2 tons per capita. Britain and the United States have a production of 6 tons per capita.

The coal consumption of Canada has always been restricted by insufficient supply, nor have the combined domestic production and imports in recent years met the requirements of the country. Manufacturing has been restricted, selling prices have been unnecessarily high, and the country has never been on "easy-street" in regard to coal supply. With present population, and potential manufacturing ability, Canada requires not less than 40 million tons annually. The historical maximum production of 16 million tons in 1920 is entirely inadequate. With a population of 10 millions, Canada should use 50 million tons of coal annually, if she is to achieve maximum manufacturing ability, freedom of political action, and domestic comfort.

In regard to the attitude of the United States towards our coal supply, it may be suggested that because of the exaggerated dependence of recent years that Canada has suffered through neglect to develop her own coal beds, we attach too great importance to what is, after all,(a matter of quite insignificant value to the United States. That country has an annual coal production which exceeds 600 million tons without having attained anything like the maximum possibility of production. The tonnage that the United States exports to Canada bulks small in that country's business, but to Canada it is a matter of economic life or death, and has probably the most important bearing on our continued political independence, being indeed our most pressing internal problem. We need not fear any criticism from informed opinion in the United States if this country develops its coal producing capacity to the utmost, but we do risk some justifiable and pitying criticism from the informed and well-disposed among our neighbors, and something worse from the ill-informed and hostile minority that is clamorous in inverse ratio to its numbers, if we continue to drop behind in the great international game of industrial emulation in which coal and iron are the king pieces.

What are the remedies and what of the future?

There are three territories to consider, namely:

a. Eastern Canada, tributary to the Eastern Coalfield.

b. The "Gap of Ontario."

c. The Provinces West of Fort William

Two trade outlets are open for coal in the East, the home market (including Newfoundland), and the overseas export market. It does not seem an unreasonable aim that the Maritime Provinces and Quebec, including all the Railways that serve this territory, should be supplied with domestic mined coal. The larger and more stable the market the more cheaply will it be possible to mine coal in Nova Scotia, and it may be permissible to contend that on no national grounds can the purchase of coal from extra-national sources for national transportation lines be excused or defended without grave inconsistency.

The export trade, in view of the limited quantity of the coal reserves in Nova Scotia, is probably not one to be encouraged to a point of national deprivation, but it has never reached that point, and what promised to be the commencement of a permanent and profitable trade with Europe was quickly killed by the ill-advised export embargo of last summer.

Export trade is desirable at the favorably situated Nova Scotia mines and will probably develop later, and irrespective of conditions in Europe that are now passing and are losing some of their urgency. The record of the operators of Nova Scotia is sufficient to show that they have always paid first attention to the home market. No Nova Scotian coal has been offered for sale in the Montreal market since about 1916, but it will appear again in the summer of 1921.

In Europe, the nationalization of coal mines is a burning political question. Millions of men, including not few Canadians have fought and died for the coalfields of Europe. The coalfields of the Maritime Provinces is a lone and singular deposit in all Canada for a space of 1,800 miles. In this distance it provides the sole source of all the means of modern national defence that we have any right to call our own. It is producing, and has produced for six years, less than it did in 1913, yet the only definite action taken in regard to this incalculably precious national asset during this whole period has been the imposition of control and embargo.

The record is one that shows not indifference, because there is no necessity to apply such an epithet to men who have doubtless done their best to pilot the ship of state, but it does show, plainly that the primary national importance of coal supply has escaped the attention of our statesmen.

As to the "Gap of Ontario" there is little to be said except to urge the lessening of the gap by the maximum extension of the radius of distribution of the eastern and western coalfields, and to support any favorable engineering opinion on the feasibility of a deepening of the St. Lawrence waterway.

In regard to the Western Coalfield, in which is included the continuous deposits of Saskatchewan, Alberta and British Columbia, and the detached fields of Vancouver Island and Northern British Columbia, the conclusion cannot be avoided that here lies the future workshop of Canada.

In his classic work on the "British Coal Trade," Prof. H. Stanley Jevons, writing before the war, (in 1913) in regard to the untapped coalfields of the world stated:

"We have to recognize that the Malthusian check "to the increase of population operates in a totally dif"ferent manner when people of any region change by "the aggregation of capital and spread of education "from a purely agricultural community to a manufac"turing nation with an organized modern commerce "A great stimulus to such a change will come "wherever coalfields exist, and the population will "thrive and develop upon the coalfields of the world, "almost like flies upon honey."

Edwin C. Eckel in an important recent book on "Coal, Iron and War" points out that under modern conditions, given the possession of raw materials, the industrial growth of a community need not be slow but may even be compressed into a period so short as ten years.

The application of these two mature opinions to the conditions in the Canadian West emphasise the obvious. Hitherto our dependence on extra-national sources of

fuel has been associated very largely with the industrial eminence of Ontario, which is based on Pennsylvanian coal; but the new orientation which we see in the West promises an infinitely larger industrial growth over the western coal beds. Here, in the writer's opinion, will be founded the great pillars that will in the days to come support an industrial fabric transcending all present imaginings, and will, if wisely guided ,prove "the most stable guarantee of our political permanence as an independent people." The coalfields of the West are large anough to build a nation on.

The most hopeful sign in this connection is that the people of the West have realised their coming industrial importance, and those who were privileged to attend the Winnipeg meeting of the Institute realised that, whatever may be the case in the East, there has been formulated in the West that first requirement for a successful coal industry, what we will call a "coal conscience" among the general public.

It is evident however, that rapid as may be the growth of population in the West, the outlet for coal there is smaller than the existing capacity of the collieries unless an export trade is found possible. British Columbia is favorably situated, and its export trade is growing and is assured by the lack of good quality coal, except in Vancouver Island, along the whole length of the Pacific seaboard of North and South America.

The possibility of exporting Alberta coal to the States lying immediately south, and to outside points via Vancouver is not by any means a remote one, and the extent of this trade is limited only by the market available.

The writer suggests that the present lop-sided arrangement of coal interchange between ourselves and the United States may be restored to a point less endangering to national safety, and less humiliating to national pride, and at least to the fifty-fifty basis that formerly obtained, by the following procedure that is submitted as possible, namely,

(a) Complete independence of imported coal in the Maritime Provinces and Quebec, and in part of Ontario, achieved by enlargement of the Nova Scotian production.

(b) A moderate export trade from Nova Scotia to overseas points.

(c) Complete independence of imported coal in all Canada west of, say, Fort William or Fort Francis achieved by enlargement of transportation facilities, and recognition by the western railways that coal has become a permanent and growing feature of rail transportation in the West, both eastwards and westwards of the Alberta bituminous areas.

(d) Organized effort to secure export markets for Alberta coal, both southwards into the States and through the ports of Vancouver and Prince Rupert.

(e) Enlargement of the export market of Vancouver Island coal.

WRIGHT-HARGREAVES.

Another important event in the history of Kirkland Lake gold area has taken place. The mill at the Wright-Hargreaves was put in operation on April 27th. It is an up-to-date mill and cyanide plant of 150 tons capacity and will help to swell greatly the gold production of the area.

COAL RESOURCES OF BRITISH COLUMBIA.

(By our Victoria Correspondent.)

With public opinion roused over the retail cost of coal needed for industrial and domestic consumption in the Canadian Northwest, and particularly in the chief Canadian coast cities, there is much interest taken in proposals that fuel be brought in from interior Provincial points, and even from the Province of Alberta, to compete with the product of Vancouver Island.

At present the coal of the Island is used, to the exclusion of practically all the other products, in Vancouver, Victoria, and most other cities of the British Columbia Coast, and, as well, is found competing in the markets of the State of Washington. It also holds the greater part of the mercantile business of the Northwest.

The recent Commission of Inquiry, held under authority of the Provincial Government, has drawn attention to the conditions under which mining is carried on in the Island fields. Although the evidence taken was conflicting in some cases there appeared to be marked unanimity of opinion that the collieries, under the circumstances, were not getting too much for their product. The high costs of material, the high wages in comparison with pre-war scales although not out of proportion to other advances, and the difficulties encountered in winning the coal because of faulty and dirty seams, were given as the chief reasons for the rise in the prices at which coal had to be sold in order to assure a fair profit.

While the collieries were able to give convincing testimony, submitting figures in support of their position, the consuming public is not satisfied that coal cannot be furnished them at a better rate than from $12 to $15 a ton. Their advocates point to the proximity of Vancouver, Victoria and other centres of population to the coal and argue that such prices cannot be justified when the mines are but a short water-haul from the consumers. If the coal of the Island cannot be produced more reasonably, why not get it from the Nicola-Princeton District, or from the Crow's Nest, or from the adjacent province of Alberta? It is understood that already one of the collieries of the Nicola District is shipping to the Coast and placing the product on the market below that of the Island. The shipment of Crow's Nest coal to the coast would seem to be scarcely practical when it is remembered that mining costs there are not much below those of the Coast, and there is the addded expense of transportation to be figured. Some of the coals of Alberta, however, might be so transported and placed on the market in open competition with better chances of success. In some of the mines of that Province, not far from the Provincial border, the recovery of the coal is an easy and inexpensive matter, comparatively speaking, and it is quite possible that Island coal will find a real competitor from this source. This depends, of course, on the continuance of the existing economic conditions.

It must not be assumed that the coal fields at present under development comprise even a substantial proportion of the whole of the resources of British Columbia of this character. There are extensive areas in the Crow's Nest Pass District, in the Flathead River Section, in the Peace River and Groundhog Counties which have not yet been exploited. D B Dowling, of the Canadian Geological Survey, places the

"probable reserve" of the Province in coal at 76,034,942,000 metric tons.

There has been much said of the coal production possibilities of the Peace River Region. Reports of prospectors are to the effect that there are large outcroppings to be found along the banks of the different waterways, one of the chief mentioned being the Carbon river. Analyses of these coals have been most satisfactory, in fact experts concur in the opinion that the fuel found in this section, if the seams on development hold to the quality of samples taken from the surface, would be ideal for steaming purposes. Little official knowledge, however, exists regarding either the quality or the probable extent of these deposits, no doubt for the reason that lack of transportation facilities, and the plenitude of coal in parts more accessible, has made the prospect of their development very doubtful. Conditions, however, have been changing rapidly of late. The Pacific Great Eastern Ry. is at the portals of Fort George and, however unlikely its extension to the Peace River Country may seem now, because of provincial financial stringency, there is no doubt that, having got so far, the demand for traffic for the road, and the attractiveness of the northern field, will force a continuance of the line into this superlatively fertile region agriculturally, and exceedingly promising zone mineralogically.

C. F. J. Galloway, an English coal mining engineer of repute, went through the Peace River territory some years ago. He had time for little more than general observations but his report is most interesting. The coal bearing formation, he finds, extends along the Peace River from near Parle Pas rapids to Hudson Hope, or a distance of about fifty miles. Formations on the south Pine and the north Pine rivers also are mentioned so that the possible area of coal formation amounts to several hundred square miles.

A number of coal seams are noted by Mr. Galloway as outcropping along the Peace River Canyon and on Gething Creek, but these are not, in the majority of instances, of any considerable thickness. He classes the coal as "high-carbon bituminous", an excellent grade of coal, low in ash. An analysis of a typical sample is given as follows:

Water	2 per cent
Vol. Combustible matter	20.2 "
Fixed carbon	72.2 "
Ash (non-coking)	5.6 "

In this connection, Mr. Galloway says:

"These analyses show the coal to be of very high grade. While not comparable with the best Welsh Admiralty steam-coal it is equal to a high grade of steam-coal from that field, and compares favourably with the best West Virginia coals, being altogether of an exceptional quality for Western America."

Another large field awaiting development, but at present economically impossible because of transportation difficulties, is what is known as the Groundhog, situated in Northern British Columbia. The coal bearing formation, as far as has been indicated by prospecting, covers an area of about fifty miles in a north-westerly and south-easterly direction, with a width of about thirty miles. At one time there were some coal leases held in this field covering some 600 square miles but many of these have since reverted to the government.

A number of the many coal seams discovered have been more or less prospected by tunnelling, and some are so situated as to assure good commercial mining conditions. While the prospecting has been somewhat superficial, and the development nothing more than what is possible by hand, no diamond drilling having been attempted, there is no doubt that there are many seams that admit of easy mining, and that, generally speaking, the field has great possibilities.

The coal has been classed as anthracite, although some of it is more nearly described as semi-anthracite. It is excellent coal, though the ash content is somewhat high. Some of the seams, however, are lower in ash, running from 5 to 10 per cent. The latter would make a first-class domestic fuel and probably would be able to successfully compete for the domestic market in the Prairies and northern British Columbia. Some of the semi-anthracite of the Groundhog no doubt is well adapted for steam-raising purposes.

BRITISH COLUMBIA COAL OUTPUT FOR MARCH.

From our Victoria Correspondent.

There was a slight increase in the production of the British Columbia Collieries in March as compared with that in February. The mines of Vancouver Island report an output of 134,837 tons as against 128,376 tons for the previous month, an advance of 6,660 tons. In the Crow's Nest Pass District the improvement was a trifle more marked, the March production being 68,739 as compared to 60,454 tons, or an increase of 8,285 tons.

The collieries of the Nicola-Princeton District have not been getting as satisfactory results according to the monthly statistics. The Middlesboro Collieries turned out 4,564 tons in March and 6,738 in February, dropping 2,164 tons. The Fleming Collieries fell off 1,455 tons. The Coalmont Collieries, however, did better, the output for February being 4,420 tons and that for March 5,477 tons, an advance of 1,057 tons.

Following are the complete figures for the month of March:

Coal Output for the Month of March, 1921.

Vancouver Island District.

Mine	Tons
Canadian Western Fuel Company	17,547
Canadian Collieries	
Comox	10,567
Extension	17,691
South Wellington	8,234
Pacific Coast Coal Mines	Nil
Nanoose Wellington	1,976
Granby	15,822
Old Wellington (King and Foster)	199
Total	135,036

Nicola-Princeton District

Middlesboro Collieries, Middlesboro	1,561
Fleming Coal Co.	1,781
Princeton Coal and Land Co., Princeton	Nil
Coalmont Collieries, Coalmont	5,477
Telkwa Collieries, Telkwa	Nil
Total	11,820

Crow's Nest Pass District

Crow's Nest Pass Coal Co.	
Coal Creek	36,291
Michel	25,908
Corbin Coal and Coke Co., Corbin	6,540
Total	68,739

SALE OF FLIN FLON GIVES IMPETUS TO NORTHERN MINING.

By REECE H. HAGUE, The Pas, Man.

No greater impetus to mining in Northern Manitoba could have been given than the recent sale of the Flin Flon property which has been taken over by the Mining Corporation of Canada and British capital.

When the Col. W. H. Thompson syndicate of New York allowed the twelve months option which they had on the property to expire, it was feared locally that it would be a long time before a purchaser would be found, as many copper mines on the Continent were going begging and the copper market was in a phenomenal state of depression. The syndicate's option expired on March 31st and less than a fortnight later word came through that the property had been sold to other interests.

The terms of the sale have not yet been made public but it is thought that the purchase price is in the neighbourhood of $1,500,000, similar to the price asked of the Thompson syndicate, with payments extending over a period.

The Flin Flon property has been the centre of attraction in Northern Manitoba ever since its discovery in 1914 and a sum of $750,000 has been spent on it by various companies which have it under option.

As a result of diamond-drilling the ore body has been calculated to contain a minimum of 16,000,000 tons of ore carrying values in gold, copper and silver to the extent of $7.09 a ton with copper estimated at 12½ c. a lb. In all 25,664 feet of diamond drilling has been done on the property, checked by cross-cutting and drifting in the 100 feet, 200 feet and 300 feet levels. While the drills did not continue below the 900-foot level, the ore-body extends below that level over a length of at least 100 feet and, when drilling ceased was 30 feet in width. Below this level and at the south end of the ore-body, at depth, not yet explored by drilling, there is undoubtedly ore not considered in the figures given, which can only be estimated by further work.

In addition to the values given above the ore contains 3.80% zinc but it has not yet been established what value, if any, of the zinc can be economically recovered.

In the course of a report submitted to the Manitoba Provincial Legislature the Commissioner for Northern Manitoba, Dr. R. C. Wallace, said:—"The total costs, including mining, delivery of waterpower, fluxes and fuel, smelting operations, refining, marketing, interest on capitalization, depreciation and sinking-fund have been estimated as, at a minimum, $4.08 per ton at pre-war prices on an operating basis of 2,000 tons per day.

"The total period of operation of an ore-body of 16,000,000 tons on a 2,000 ton per day operation basis is 27 years. If an additional period of five years be assumed for railway construction, power development, opening up of mine, construction of smelter and solving metallurgical difficulties, a period of 32 years may be taken as the duration of operations on the Flin Flon property, without taking into calculation any additional ore which may be discovered below the 900-foot level.

"The total number of men required for mining operations, smelter, mining of fluxes, power plant and transportation, would be approximately 1,000. The relatively long period of operation would attract married men to the town, and up-to-date school facilities would of necessity be provided. The town would be placed in the centre of a district in which the opportunities for prospecting are very good, and a very considerable mining population, not directly connected with the operation of the Flin Flon property, would become residents in the town. The development of other properties in the district would of course add to the population to an extent which cannot now be estimated. Apart from this last consideration, the population of the mining town may be conservatively estimated at from 3,000 to 5,000 people in five years after the completion of the railway."

The interests which have secured the Flin Flon property are endeavouring to induce the Manitoba provincial government to construct a railway to Flin Flon, and in this regard they are backed by The Pas Board of Trade and the whole of the Northland. When the property was under option to the Col. Thompson interests, the Government had an initial survey of the proposed line made at a cost of $15,000, on the understanding that if the syndicate did not exercise their option they would re-imburse to the Government the cost of the survey.

The Provincial Treasurer announced that in the event of the syndicate putting up a guarantee of $1,000,000 the government would bring the matter of the railway before the house, but it is thought that in consideration of the fact that the property has been taken over by Canadian and English interests these terms might be modified.

One of the strongest arguments advanced in favor of the Manitoba legislature building the railroad is the example of the Ontario Government railway. The Temiskaming and Northern Ontario Railway was built by the Government of Ontario with the expressed object of opening up the northern clay belt, through which the transcontinental railway now passes, to agricultural settlers. It was known that there were possibilities of mineral discoveries, but no discoveries of importance had been made when the decision was made to proceed with the railway. Since the construction of this railway the production of gold, silver and cobalt from T. & N. O. Ry. territory exceeds $260,000,000. The annual production of gold from the Porcupine camp alone is $12,000,000. The direct returns to the Province of Ontario in royalties and taxes amount almost to $5,000,000 since the railway was built. The yearly operating profits on the railway are $500,000 and 25 per cent of the capital has already been returned.

In reviewing these figures Professor Wallace says:—"Owing to this policy of development in northern territory, the Province of Ontario stands first as a mining province in the Dominion and has greatly added to the standing of the Dominion as an economic unit in the British Empire. No one dares criticise Ontario's policy in connection with her northern railway at the present day. What Ontario could see 17 years ago in mineral wealth in that area where the railway has been projected was small indeed in comparison with what Manitoba has proved up, even before the railway was discussed."

Even though a railway to Flin Flon is not commenced this Summer there are indications that there will be considerable activity in connection with mining in Northern Manitoba. The sale of the Flin Flon has given an impetus to mining generally in the district.

and it is expected that the open water will see an influx of prospectors and mining engineers.

Little actual mining work can be done in the Flin Flon area until the railway is constructed and a smelter erected, but prospecting will continue and it is quite probable that many other prospects will be uncovered. Up to the present prospecting in the district has principally been done around the lake shores and little is known of vast areas of mineralized country.

At Herb Lake mining will continue as heretofore and it is thought that the search for oil will be carried out by many individuals and syndicates in the Pasquia Hills region. Altogether the coming Summer promises to be the most active in the history of the mineral development of Northern Manitoba.

FORECASTING HOLLINGER ACHIEVEMENTS.

ALEXANDER GRAY.

Because it is officially announced that the Hollinger Mill has gotten its capacity stride, or thereabout, the off-hand assumption is the management may "go after a world record."

While admitting the tonnage being milled is the greatest yet as a continuous performance, the management at the same time is discreetly non-commital as to what it may or may not accomplish in the matter of gold production.

To achieve "a world record"—were anything to be gained by that—however gratifying it might be to the chief owners—is not to be so easily attained when it is considered that New Modderfontein Mines with a 1920 record of profits amounting to £1,716,840, and Government areas, with a record of £1,633,325 in profits, have a lead it will be difficult to deprive them of.

Hollinger Consolidated last year reported profits of $3,792,341. It crushed only 53 per cent of the possible running time. At the moment it is not ascertainable whether New Modderfontein and Government Areas were correspondingly handicapped. All three companies profited by reason of the premium upon gold. Granting, however, that the two largest producers at the Witwatersrand fared better than Hollinger in the supply of labor and whatever accelerated production, the outstanding fact is that Canada's premier gold mine has some distance to go before it beats the record.

By capacity crushings without interruption and with every possible facility, Hollinger is capable of contributing $10,000,000 or more per annum. Spectacular "stunts" never have been attempted by the Hollinger Directors, though, and it is inferable that their grade of ore will be lowered somewhat when maximum crushing is being secured. In due course a total production of about $10,000,000 is likely, but New Modderfontein and Government Areas gross is much above that impressive aggregate.

Considered in connection with its restricted running time, Hollinger Consolidated sustained its claim in 1920 to pre eminence as one of the three or four greatest gold mines. Automatically as the tonnage milled increases, Hollinger profits should be larger, yet there is a limit beyond which forecasts ought not to be stretched, for the Hollinger Company were harrassed for ten years—and operating conditions are not altogether satisfactory. For example New Modderfontein has almost 9,000,000 in proven ore reserves and a possible further 16,000,000 tons. The average grade is lower than that of Hollinger. Last year, however, the New Modderfontein working revenue was 52 shillings and nine pence on 968,500 tons crushed, and the average profit was 30 shillings and ten pence. For the Government Areas, the working revenue was thirty-nine shillings and three pence, and the per ton profit, eighteen shillings and three pence on over 1,300,000 tons crushed. In the same period Hollinger crushed only 650,205 tons so comparisons of operating results are made difficult. At any rate Hollinger's grade of $10.20 averages from a dollar-and-a-half to a dollar-and-seventy five cents higher than that of either of two Rand producers. Consequently, if the Ontario mine can attain to a crushing of a million tons and over, it will have a larger place in the sun—and that without eclipsing either of its great contemporaries. For the time being this should suffice. Hollinger has to look ahead, get twice as many machines to work, pile up ore reserves—and those familiar with the vein systems thoroughly appreciate that the mines never have had a chance to demonstrate to the full their immense value.

So, why worry about "going for a record—a world record!"

PERSONALS.

Mr. E. V. Neelands of Toronto will leave shortly for Columbia, South America. He will spend several months there on exploration work.

Mr. F. W. Schumacher, of Columbus, Ohio, is in Toronto. He is interested in the Schumacher gold mine at Porcupine which has been idle for some time. It is not yet known whether the property will be operated this summer.

Mr. Cyril Knight, Assistant Provincial Geologist, will spend the coming summer at Cobalt continuing the underground study of the geological features of the Cobalt silver deposits on which he was engaged last summer.

Mr. A. G. Burrows and Mr. P. E. Hopkins will map Skead township and neighbouring gold areas this summer. Mr. Burrows will probably spend a few weeks in the Gowganda silver area.

Mr. E. L. Bruce, professor of mineralogy at Queens University will make an investigation of the Lake St. Joseph area, Northern Ontario, for the Ontario Bureau of Mines this summer. Some iron ore deposits occur near Lake St. Joseph, which is an expansion of the Albany river near its head.

Mr. E. M. Burwash, assistant professor of geology at the University of Manitoba, will explore an area along the Ontario Manitoba boundary this summer for the Ontario Bureau of Mines.

Mr. and Mrs. Freeheville of London, England, are in Toronto. Mr. Freeheville has returned from a trip to Northern Ontario gold mines.

MEETING OF MINING WOMEN'S ASSOCIATION TORONTO

We are courteously informed by Miss Nancy M. A. Miller that the Toronto Branch of the Association of the Women of the Mining Industry of Canada had a largely attended and enthusiastic meeting on the 26th April at the residence of Mrs. D. A. Dunlap, when Mrs. Freeheville, before leaving for England, addressed the meeting. Several new members were elected, and plans for the coming year's work were gone over.

Northern Ontario Letter

THE SILVER MINES

The Cobalt District.

Silver mining in Northern Ontario has appeared to settle down into a fairly steady groove in Northern Ontario, and a very considerable increase in the amount of work being done is noted. This applies especially to the Gowganda district.

In Cobalt itself, the scope of work has been increased to a moderate extent owing to the Mining Corporation of Canada having resumed operations on its Buffalo mine. This company now has a force of about fifty men on its pay-roll, and in addition to re-opening the Buffalo mine has been remodelling its mill. This work in the mill will be completed before the middle of May and will provide facilities for treating 300 tons of ore daily as compared with a former rate of 200 tons daily. Officials continue to be reticent with regard to the probable date of resuming work in all branches, but, in Cobalt, it is generally believed a start may again be made during the second week in May.

At the annual meeting of the Nipissing Mining Company, the tenor of the remarks made by officials provided reason for believing that production from this property may be somewhat lower than during the past three years. The company expresses its intention to secure oil lands of merit, if possible, as well as being constantly in the field in search of new mining properties.

Rumors have been current in Cobalt that a move might be made to resume work on the Temiskaming mine. Local officials were not aware of any such decision when interviewed by the Journal. It is learned, however, that J. P. Bickell, president of the Temiskaming has just returned East from a business trip to the Blue Diamond coal mine in Alberta, in which the Temiskaming is interested.

The recent cut in wages, together with a small reduction in the price of dynamite and with higher efficiency from the mine workers all combine to hold out probabilities of the cost of producing silver undergoing a substantial decline during the current year. This situation, of course, is quite as important as had costs remained unchanged with a substantial increase in the price of silver. It seems to mark a general steady movement toward conditions which promise to offer greater encouragement for all property owners to feel justified in resuming work. The situation is a great deal more re-assuring than was the case two months ago.

In connection with the operations of the Trethewey company on its Castle property in the Gowganda district, the information reaching Elk Lake would tend to show that this company is meeting with very satisfactory results. It was recently reported that a plan might be adopted whereby the number of shares of the Trethewey would be increased so as to provide a means of raising money with which to erect a small mill on the property. In view of the present favorable reports, certain shareholders are found expressing the belief that the company may be able to finance itself from current production of high-grade ore.

According to advice received by the Elk Lake board of Trade from the Ontario Government, plans are being made to further improve the road from Elk Lake to Gowganda. The first nine miles of the 27-mile stretch is said to be in good condition, and repair work will proceed from this point. The object is to make the road suitable for travel by motor trucks and automobiles. This would offer important advantages to those who are commencing mining operations in that field.

The price paid for the Hargraves property, by the Kerr Lake Mining Company is understood to have amounted to something over $16,000, according to New York advice. This is understood to be sufficient to about cover the debts of the Hargraves company.

The Ontario government has dropped its bill which had for its object an increase in the tax on the profits made by mining companies in this province. A united opposition from all over Northern Ontario was supported by both Conservative and Liberal parties in the Ontario House to the end that the bill was set aside for the current year. This is what mining men requested, and due credit is given to the press of the North, as well as other mining and financial journals in Canada for providing much valuable comment. The leading figures in opposition to the bill were Hon. G. Howard Ferguson, Conservative leader; Hartly Dewart, Liberal Leader; Charles McCrea, M.P.P. (Conservative) for Sudbury and Mac Lang, M.P.P., (Liberal) for the Cochrane district.

Another bill now before the House proposes to provide legislation which would give wide powers to engineers. This is known as the "Professional Engineers Act", and would establish rules which would debar any other than members of this association from practicing in the province of Ontario. As far as giving engineers the right to certain letters which may be used exclusively by the profession, the feeling in the mining districts seems to be strongly in favor of the measure, but there is an exceedingly strong undertone against that portion of the bill which would prevent practical miners from practicing even under their correct status as "practical miners". To give engineers the right to add "Registered Professional Engineer", or any letters designating such status seems to meet with general approval, but if any attempt is made to prevent others from practicing without use of these letters, there will probably be a storm of protests come out of the North where many practical men are achieving important success for themselves and the companies which they represent.

According to a statement made to the Journal representative by an official of the Silverado Mining Company of Gowganda, this concern was originally capitalized at 1,000,000 shares of the par value of $1 each, of which 415,000 shares were issued in payment for the property. "The treasury stock", says the statement, "at the beginning of the present year was sufficient to cover the operations of the Silverado as originally planned, but the acquisition of the four valuable properties and the treasury assets of an adjoining company necessitated an increase of capitalization. After paying for this new property which was exclusively on the basis of a transfer of shares, the Silverado to-day has more than 2/3 of capital stock in the treasury with full ownership of its properties and no outstanding liabilities. The total amount of property which the company now holds is 560 acres. At the present time, we are engaged in surface work and putting up new buildings, but in the course of the present year we expect to continue our underground work."

At the Keeley mine, underground operation are now in full swing. A force of about 30 men makes up the crew for the time being. It is intended to carry on

development work at the 360-ft level, pending a strengthening in the demand for silver at which time the mill will be started up.

Ore and Bullion Shipments.

During the week ended April 29th no shipments of ore were reported from Cobalt to outside points.

Bullion shipments were also nil, although on April 30th the Nipissing sent out 38 bars containing 50,265 ounces of silver.

THE GOLD MINES.

The Porcupine Field.

May has ushered in the beginning of an era of big production for the gold mines of the Porcupine district. The four producers are turning out gold at the rate of $1,500,400 for the 31-day period, or at the rate of over $18,000,000 a year.

Production at the Hollinger, based upon 3,300 tons of ore daily in which the gold content is $10 a ton, is at the rate of $1,023,000 for the current month.

Production from the Dome, based upon 1,100 tons of $7 ore daily is at the rate of $238,700 a month.

Output from the McIntyre-Porcupine, based upon 580 tons daily or ore containing $11 a ton, is at the rate of $197,780 a month.

The Northerown Mines (which is a consolidaton of the Porcupine Crown and Thomson-Krist properties) is just nicely under way and has an indicated daily tonnage of 120 tons containing $11 a ton, or a monthly output of about $40,920.

The production from these four mines gives the indicated aggregate as given in the opening paragraph of this letter.

In addition to the value of the output as above given, the companies dispose of their gold in New York, and in that way a premium of upwards of 10 p.c. is added to the total as above given.

Imposing as the foregoing brief summary may be, it is interesting and important to keep in mind that a further increase of about 1,000 tons may be added daily and, on the basis of $10 ore, would add at the rate of over $300,000 monthly to the output. This increase will come as a result of the Dome speeding its mill up to full capacity of 1,450 tons daily, the McIntyre completing its milling additions, the Schumacher starting up its 200-ton mill, the Porcupine V.N.T. getting under way at 150 tons daily and some use being made of the 100 ton mill on the Dome Lake.

Altogether, it would appear as though the mines of Porcupine will produce at the rate of over $20,000,000 per annum during the coming year.

A first-mortgage bond issue made by the Northerown Mines, which was reported to have been taken up by the Crown Trust Company, in Montreal, is stated to have been taken care of by the Porcupine Crown Mines, with the Crown Trust Company acting only as trustees. Of the $100,000, the Porcupine Crown was supposed to take up two-thirds and the remaining one-third to be taken up by the Thompson-Krist. The Porcupine Crown took care of its share, but the Thomson Krist has not been able to provide the funds to cover its obligation.

The Kirkland Lake Field.

The Kirkland Lake district is making remarkable headway. The correspondent of the Journal has just concluded a visit to all the important operating properties in this area, and the impression is left that the mines of this field have met with results which strengthen their physical condition to a greater degree than is generally understood by other than those who are in constant touch with progress.

At the 600-ft level of the Lake Shore mine, the No. 1 vein has been cut and has a width of upwards of 12 feet. The mineralization has increased considerably as compared with the 400-ft level, and this vein promises to be equally as rich as the No. 2 vein in which values have averaged over $25 to the ton. The machines were just entering the No. 2 break at the time the writer visited the property and it was too early to learn the width and mineral content of this body at that horizon. It is interesting, however, to keep in mind that this No. 2 vein as opened up at the preceding level, namely 400 feet deep, is among the richest veins ever opened up in the gold mining districts of Northern Ontario. On this vein at the 400 ft level one stope has been opened up over a length of 350 feet and has an average width of 11 feet in which gold values average upwards of $28 to the ton. In this stope there are approximately 18,800 tons of ore already broken with an aggregate gold content of over half a million dollars. A second stope, 300 in length is also being opened up at the 400-ft level. It has been noted that during the past two months the mill heads at the Lake Shore have been quite low, amounting to $13.35 a ton during March. This caused some uneasiness among those not familiar with the work. The fact is, however, that during recent years the company was unable to carry on the desired amount of development work owing to a shortage of labor, and with the present changed conditions a lot of energy is being directed toward development. As a consequence of this, the volume of ore coming from development work is alone sufficient to keep the small mill running at full capacity and is making it impossible to treat any of the higher grade ore from the stopes. The development ore contains a certain amount of waste rock, but it is necessary to treat all this material which is coming from development. It is obvious, therefore, that there is general cause for optimism among those who are concerned in this enterprise. In a word, with the small 60 ton mill, the gold being produced is financing the Company in the work of developing the mine as well as providing funds for moderate dividend disbursements and funds for enlarging the plant. In due time the shareholders will reap the full benefit of this policy.

Blasting out the excavations for the new 100 ton mill on the Ontario Kirkland has commenced, and this company expects to have its plant running before the end of September. Underground developments are favorable and ore resources promise to enable the company to establish mill heads of around $15 to $18 a ton.

With a crew of about 80 men employed, the Teck Hughes Gold Mine is treating close to 120 tons of ore daily, or nearly 1½ tons per man employed. This is the secret of low costs at this property, and compares with less than one ton per man on certain other small operations. This company is finding the great volume of its ore is located on the central and eastern part of its property. This is important for the reason that it reduces the danger of the ore dipping off the property at depth.

The mill of the Wright Hargraves is now in full operation. At the time of the Journal correspondent's visit, the plant was being tuned up and was then treating about 125 tons daily. It is not intended to crowd the plant to full capacity of 160 to 180 tons daily until

such time as stopes may be opened at the various underground levels.

On the Kirkland Lake Gold Mines, it is being found that at depth the ore-shoots have a greater length than on the preceding levels. Work is proceeding at the 700 and 900-ft levels, and a drift at the 700-ft level has been in ore to a greater distance toward the west than was the case in the long west drift at the 400-ft level.

BASE METAL SALES AND CONSUMPTION IN CANADA.

The annual report of the Consolidated Mining and Smelting Company of Canada contains some interesting figures relating to the sales and consumption of the base metals in Canada, as reported by Mr. Rugh, the Sales Manager. The statement is as follows:

"The sales of base metals for the year 1920 were as follows:

	Lbs
Lead	19,064,000
Zinc	31,470,000
Copper	5,036,000

Lead.

The domestic demand was good during the first half of 1920 and continued strong well into the third quarter. Signs of weakness developed and the price commenced to fall in the month of August. From then until the close of the year the market prices dropped almost continuously, accompanied by a light demand.

Zinc.

Sales for Canadian requirements were uniformly good with a steady demand throughout the first three-quarters of the year. During the last quarter conditions were somewhat similar to those affecting lead. As our production of zinc was considerably in excess of the consumption in Canada we were obliged to ship our surplus to the United Kingdom, France and the Orient where it was sold through very satisfactory connections which we established in 1919, in London, England, and in Kobe, Japan.

Copper.

During the early part of the year sales were restricted owing to strike conditions in Rossland — and the non-receipt of ore from independent shippers. Later, when this condition had passed, the market prices fell and the demand declined, with the result that a considerable quantity of this metal had to be carried over the year end.

Outlook for 1921.

At the opening of the year the outlook was not favorable for the sale of normal quantities of our metals, but the demand over the first quarter having exceeded expectations we think we are justified in the belief that the Lead, Zinc and Copper requirements for 1921 will closely correspond with the Canadian consumption of these metals for the year 1920. We look forward confidently to an increasing demand in the Orient for our Lead and Zinc, which owing to very high purity, are rapidly coming into favor.

We estimate the Canadian consumption for 1921 as follows:

	Lbs.
Lead	48,000,000
Zinc	25,000,000
Copper (Ingot-Cake)	14,000,000
Copper (Wire Rods)	32,000,000

SUDBURY NOTES.

D. E. CUSHING.

The old Mackenzie and Mann smelter, erected in 1905, which has stood idle since 1912, has been sold by the City of Port Arthur to American interests and the outlook is that the iron industry will again get under way at the head of the Lakes.

The names of the purchasers have not as yet been announced, but will be made public shortly when the matter comes before the people of Port Arthur for ratification. The price is a million dollars. Within four years $200,000 will be paid. If operations are to then continue, the balance must be met and half of it must be in cash.

The city of Port Arthur came into control of the blast furnace by the purchase of the first issue of bonds.

Not long ago the Atikokan mine was optioned by Duluth interests but it is not thought that the two deals are connected.

Another property has opened up in the Howery Creek area, which gives this new gold camp three excellent prospects under development. The Bousquette and Howery Creek Co. were the first two in the field and this week saw a third, managed by Mike Athella of Matheson, get under way.

This newest property is located on the West River, near Hockin's mill. It is known as the Powell property and a boiler, drills and a compressor have just been taken in. Before May is very old a start on shaft sinking will have been made. The shaft has been carried down some distance by hand-steel, and assays across the width of the shaft show an average value of $12.50. This property is about two miles from Willisville on the Algoma Eastern Railway.

The Howery Creek Co. is working twenty-four hours daily on driving its tunnel to cut its main ore-body. Just recently when the tunnel was 199 feet in, it cut a hitherto unknown ore-body, the vein of which is 18 inches wide. Samples have been sent to the assayers, but the reports have not as yet been received. However, some of the ore was panned and it showed fine gold. A new Waugh-Dreadnaught drill has just been installed, and about nine feet daily is being made in driving the tunnel, which is five by seven feet. The tunnel is now in over 100 feet and must be carried to the 300-ft. mark to cut the ore-body aimed at. This will open up the ore-body 100 feet down. There are some mining men who question the wisdom of driving 300 feet to save 100 feet of hoisting, but Manager Kemp thinks the plan has its advantages. During the winter the company took in most of its plant. They were unfortunate in that a part of it broke through the ice while being teamed across the lake and sank. It will be recovered later. In the meantime a concentrator and a new kiln for the roasting of the arsenic ore, is now on the way in. The capacity of the plant is 100 tons.

The plant of the Bousquette is about ready to go ahead and immediately two drills will be started on the shaft to carry it from the 25 ft. to the 300 ft. level. Mr. Robert Tough, who also controls the Bidgood at Kirkland Lake is in personal charge of the work. He says there is every promise of the area being an excellent gold producer.

LAKE SUPERIOR MINING INSTITUTE MEETING.

The Lake Superior Institute will hold its annual meeting on the Marquette iron range, Michigan. This is the first meeting for some years, the Institute having discontinued the holding of meetings during the war.

TORONTO MINING STOCK QUOTATIONS.

Quotations on Active Stocks on Standard Stock Exchange for Week Ending April 30th, 1921.

	High	Low	Last
Silver.			
Adanac Silver Mines, Ltd.	13⅜	11¼	13⅜
Bailey	3	3	3
Beaver Consolidated	38	35	35
Coniagas	1.80	1.80	1.80
Crown Reserve	13¾	12	12
Gifford	1	1	1
Great Northern	1⅞	1⅞	1⅞
Kerr Lake	3.35	3.30	3.30
La Rose	23	20	20
McKin.-Dar.-Savage	18	18	18
Mining Corp. of Can.	2.00	.90	1.00
Nipissing	6.90	5.40	5.40
Ophir	2	1	2
Peterson Lake	6¼	5¼	6
Temiskaming	22	20	20
Trethewey	21	15½	18
Gold.			
Apex	2¼	2¼	2¼
Atlas	10	8½	8½
Argonaut Gold	35	32½	35
Dome Extension	75	73	73
Dome Lake	3¼	3¾	3¾
Dome Mines	22.75	21.75	22.50
Gold Reef	4	3⅝	3⅞
Hollinger Cons.	7.48	7.21	7.24
Hunton Kirkland G. M.	11	10	10
Inspiration	4	4	4
Keora	16	14¾	15
Kirkland Lake	55	53	54
Lake Shore M. Ltd.	1.40	1.30	1.36
McIntyre	2.16	1.96	2.00
Moneta	14½	11½	14½
Newray Mines, Ltd.	7¾	7	7½
Porcupine Crown	29	26	29
Porcupine V. N. T.	19¾	19	19¾
Preston East Dome	4	3⅞	3⅞
Schumacher	25½	24	25½
Teck-Hughes	18	14	17¾
Thompson Krist	9	7¾	9
West Dome	8½	7	7¼
West Tree Mines Ltd.	4	3⅝	3¾
Miscellaneous			
Rockwood Oil, Gas	3	3	3
Vacuum G.	8	7	8

MONTREAL METAL QUOTATIONS.

Following are fair average prices for ingot metals (in less than car-loads) at Montreal:

	April 28	May 5
Copper, Electro	17¼	17½
Copper, Casting	17	17
Tin	38	38
Lead	6½	6¾
Zinc	7¾	7¾
Aluminium	33	33
Antimony	7½	7½

Mr Douglas Wright will map an area west of Bourkes Mines, this summer. Mr Wright has previously mapped an area to the east of Bourkes.

A NOTE ON PRODUCTION AND MARKETS FOR NOVA SCOTIA COAL, WITH SOME REGARD TO ONTARIO.

By the Editor.

The highest output attained by the coal mines in Nova Scotia was 7,263,485 gross tons in 1913, which represented an output capacity of 7,500,000 tons, there having been a lack of demand in the late Summer and Autumn of that year.

The capacity of the mines for output in 1921, with uninterrupted work, and a full complement of face-workers, is about 6,500,000 tons, the difference of one million tons between the capacity of 1913 and this time being the result of exhaustion of some of the older mines within the eight years intervening, the suppression of capital expenditure by war conditions; and the deferring, from the same causes, of much of the usual advance development work underground.

The probable output, in 1921, under expected trade conditions, allowing for slack work in the Spring, and anticipating a brisk demand by Autumn, will probably reach 5,500,000 tons.

If it should prove possible to make heavy expenditures on new collieries during the near future, and if a sufficient number of face-workers could be made available, it should be possible, within a period of not less than five years from the commencement of a programme of intensive expansion of outputs, to restore the capacity of the coal mines to that of 1913, namely, 7,500,000 tons.

The maximum output that could be obtained from the Nova Scotian mines, with hope of maintenance for a period of years that would justify the initial expenditure, is estimated at 10,000,000 tons annually. It is unlikely that such an output could be obtained within less than ten years, and in seeking the attainment of a figure that means virtually doubling the present capacity of the Nova Scotia coal mines, it would probably develop that the chief difficulty would be to get a sufficient number of suitable workmen.

Before seeking to increase outputs to the maximum, operators would require to be satisfied if a market for ten million tons of coal annually were available.

A normal distribution of the present maximum production of 6,500,000 tons would — basing the distribution on pre-war business and the figures of 1920 — be about as follows:

	Tons
Used in Nova Scotia, including railways, colliery consumption, and metallurgical uses	3,300,000
New Brunswick and P. E. Island	900,000
St. Lawrence Ports	1,500,000
Newfoundland and St. Pierre	300,000
Local Bunkers	500,000
	6,500,000

Presuming that the steel industry were to work to full capacity, and not allowing for any increase in blast-furnace capacity or larger resulting coke-consumption over that of today under normal operation, the use of coal in the Province of Nova Scotia would reach 4,250,000 tons annually.

The consumption of New Brunswick and Prince Edward Island may be calculated, at a slight increase over the average of many years past, as being one million tons annually.

Newfoundland and St. Pierre de Miquelon will continue to require as much coal as in former years, and this may be put at 300,000 tons annually.

Bunkering has become an increasingly important part of the Nova Scotia coal-trade, and the coals of the Province proved their entire suitability for steamships' bunkers by wide use during the war. An annual outlet of 500,000 tons for this purpose is not over-stated.

The Boston market is not one that can be counted upon at this date, but it is also not one that can be definitely counted out. There are some possibilities in the future coal interchanges of Canada that may make the Boston market once more an important outlet for Nova Scotian coal.

The general export trade is also an uncertain factor, and until the nations of Europe settle down and international amity is more completely restored, it is not possible to say whether Europe will prove a market in which Nova Scotia can compete against the export coal of the United States. It should be remembered in this connection that Nova Scotia's coal reserve is a small one, and that there are a number of individual nations in Europe that have coal reserves which exceed those of Nova Scotia. An annual figure of 250,000 tons may be calculated as approximating the moderate export market that oversea demand will give to Nova Scotia coal mines.

The greatest and most potential outlet for Nova Scotia coal, and, from a national viewpoint, the most satisfactory and thoroughly logical, is that supplied by the growing population along the St. Lawrence River and valley, along its whole length from the opening of the Gulf to a point that is yet to be determined, but is certainly not limited by the Port of Montreal.

The final report of the Fuel Controller estimated the annual coal requirements of the Province of Quebec at 3,900,000 tons of bituminous coal and 1,700,000 tons of anthracite. There is no doubt but that a proper use of bituminous coal would avoid the necessity of using anthracite for many of the purposes of domestic heating and cooking, but, ignoring this certain development of the future for the purpose of present calculations, it is safe to say that the province of Quebec requires 4,000,000 tons of bituminous coal annually, and it is also safe to say that it would be an extremely good thing for Canada if the whole of this quantity were supplied from the coal-seams of Nova Scotia.

Summarising the foregoing figures, the following table shows the potential market for Nova Scotia coal, which, it will be noted, is almost entirely confined to Canadian needs.

		Tons
Nova Scotia		
Steel-Plant uses	1,550,000	
Colliery uses	750,000	
Domestic uses	750,000	
Railways	1,100,000	
		4,150,000
New Brunswick and P. E. Island		1,000,000
St. Lawrence Valley (Prov. of Que. only)		4,000,000
Newfoundland		300,000
Ships' Bunkers		500,000
Foreign Export		250,000
		10,200,000

Comparison of this potential market with the estimated maximum output of the province of Nova

The Canadian Miners' Buying Directory.

Acetylene Gas:
Canada Carbide Company, Ltd.
Canadian Fairbanks-Morse.
Prest-O-Lite Co. of Canada, Ltd.

A.C. Units:
MacGovern & Co
Powley & Townsley, Limited.

Agitators:
The Dorr Co
Air Hoists:
Canadian Ingersoll-Rand Co., Ltd
Mussens, Limited.
Alloy and Carbon Tool Steel:

H. A. Drury Co., Ltd.
International High Speed Steel Co., Rockaway, .
Peacock Brothers Limited.
Alternators:
MacGovern & Co.

Spielman Agencies, Regd
Aluminium:

Amalgamators:
Northern Canada Supply Co.
Mine and Smelter Supply Co
Wabi Iron Works.
Antimony:
Canada Metal Co.
Antimonial Lead:
Pennsylvania Smelting Co
Arrester, Locomotive Spark:
Hendrick Manufacturing Co.
Assayers' and Chemists' Supplies:
Dominion Engineering & Inspection Co
Lymans, Limited
Mine & Smelter Supply Co.
Pennsylvania Smelting Co.
Stanley, W. F. & Co., Ltd.
Ash Conveyors:
Canadian Link-Belt Company
Ashes Handling Machinery:
Canadian Mead-Morrison Co., Limited
Canadian Link-Belt Co., Ltd.
Assayers and Chemists:
Milton L. Hersey Co., Ltd.
Campbell & Deyell
Ledoux & Co.
Thos Heys & Son
C. L. Constant Co
Asbestos:
Everitt & Co.

Balls:
Canadian Foundries and Forgings, Ltd
Canadian Steel Foundries, Ltd.
Hull Iron & Steel Foundries, Ltd
Fraser & Chalmers of Canada, Ltd
Peacock Brothers Limited
The Electric Steel & Metals Co
The Wabi Iron Works.
The Hardinge Conical Mill Co
Ball Mills:
Hardinge Conical Mill Co
Hull Iron & Steel Foundries, Ltd
Mine and Smelter Supply Co
Fraser & Chalmers of Canada, Ltd
The Electric Steel & Metals Co.
The Wabi Iron Works.
Balances—Hensser:
Canadian Fairbanks-Morse Co., Ltd
Mine and Smelter Supply Co
Babbit Metals:
Canada Metal Co.
Canadian Fairbanks-Morse Co., Ltd
Hoyt Metal Co.
Ball Mill Feeders:
Fraser & Chalmers of Canada, Ltd
Hardinge Conical Mill Co
Hull Iron & Steel Foundries, Ltd
Ball Mill Linings:
Hardinge Conical Mill Co
Peacock Brothers, Limited
Hull Iron & Steel Foundries, Ltd
Belting—Leather, Rubber and Cotton:
Canadian Fairbanks-Morse Co., Ltd
Canadian Link-Belt Co., Ltd
The Mine & Smelter Supply Co
Northern Canada Supply Co.
Jones & Glasco.
Belting:
R. T. Gilman & Co
Gutta Percha & Rubber, Ltd
Belting—Silent Chain:
Canadian Link-Belt Co., Ltd
Hans Renold of Canada, Limited Montreal, Que
Jones & Glasco (Regd.)
Belting (Transmission):
Goodyear Tire & Rubber Co
Belting (Elevator):
Goodyear Tire & Rubber Co.

Belting (Conveyor):

Goodyear Tire & Rubber Co.
Gutta Percha & Rubber, Ltd.

Blasting Batteries and Supplies:

Canadian Ingersoll Rand Co., Ltd
Mussens, Ltd.
Northern Canada Supply Co.
Canadian Explosives, Ltd.
Giant Powder Co. of Canada, Ltd.
Powley & Townsley, Limited.

Bluestone:
The Consolidated Mining & Smelting Co
The Coniagas Reduction Co., Ltd.

Blowers:
Canadian Fairbanks-Morse Co., Ltd
MacGovern & Co., Inc.
Northern Canada Supply Co.
Fraser & Chalmers of Canada, Ltd

Boilers:
Northern Canada Supply Co.
Canadian Ingersoll-Rand Co., Ltd
Marsh Engineering Works
MacGovern & Co., Inc.
R. T. Gilman & Co.
Fraser & Chalmers of Canada, Ltd
The John Inglis Company
Wabi Iron Works.

...e Vitriol (Coniagas Brd):
Canadian Fairbanks-Morse Co., Ltd

Bortz and Carbons:
Diamond Drill Carbon Co.

Boxes, Cable Junction:
Standard Underground Cable Co of Canada, Ltd.
Northern Electric Co., Ltd.

Brazilian Rough Diamonds:
Diamond Drill Carbon Co

Brazilian Mica:
Diamond Drill Carbon Co

Buggies, Mine Car (Steel)
Hendrick Manufacturing Co

Brazilian Ballas:
Diamond Drill Carbon Co

Brazilian Rock Crystal:
Diamond Drill Carbon Co

Brazilian Tourmalines:
Diamond Drill Carbon Co
Brazilian Aqnamarines:
Diamond Drill Carbon Co
Bridges—Man Trolley and Rope Operated—Material Handling:
Canadian Mead-Morrison Co., Limited
Bronze, Manganese, Perforated and Plain:
Hendrick Manufacturing Co.
Buckets:
Canadian Ingersoll-Rand Co., Ltd
Canadian Mead-Morrison Co., Limited
The Electric Steel & Metals Co
R. T. Gilman & Co.
Hendrick Manufacturing Co
Canadian Link-Belt Co., Ltd
Marsh Engineering Works
Mussens, Ltd.
MacKinnon Steel Co., Ltd
Northern Canada Supply Co
Fraser & Chalmers of Canada Ltd
The Wabi Iron Works
Buckets, Elevator:
Canadian Link-Belt Co., Ltd
Hendrick Mfg. Co
Peacock Brothers Limited

Cable—Aerial and Underground:
Canada Wire & Cable Co
Northern Canada Supply Co
Standard Underground Cable Co of Canada, Ltd
[illegible] Limited

Cableways:
Canadian Mead Morrison Co., Limited
Fraser & Chalmers of Canada Ltd
Mussens, Ltd
The Wabi Iron Works
R. T. Gilman & Co
Cages:
Canadian Ingersoll Rand Co., Ltd Montreal, Que
Northern Canada Supply Co
Fraser & Chalmers of Canada, Ltd
The Electric Steel & Metals Co
The Mine & Smelter Supply Co
Mussens, Ltd
The Wabi Iron Works

Scotia will show that the supplying of Ontario (except in that triangle of the Ottawa and St. Lawrence which has more affiliations with Quebec than with Ontario as a whole) is not a matter of practical current politics. The Fuel Committee now sitting at Ottawa has directed some questioning to elucidation of the possible supplying of Ontario by Nova Scotia coal, but, so long as the province of Quebec is partially supplied with coal from the United States, and not wholly by coal from Nova Scotia, it will be unnecessary to devote attention to the supplying of Ontario with coal from Nova Scotia.

Central Ontario is probably the only part of Canada in which the importation of coal from the United States is thoroughly justified, except in regard to such limited quantity of anthracite as it may prove possibly for the people of Quebec to buy in the future, having regard to the high price of anthracite which will prevail, and to the improvements in fuel consumption which Quebec could bring about by full use of its water-powers and by gasification of bituminous coal for communal uses.

In view, therefore, of the probability that the coal mines of Nova Scotia cannot hope to do more than supply the coal requirements of the future in the Maritime Provinces and the Province of Quebec, and in view of Ontario's perpetual problem of fuel supply, it is not amusing, but tragic, that Ontario should have decided it no longer needed a central fuel authority. A fuel problem is inherent in the geographical and political condition of Ontario, and the inability of the leaders of political thought in Ontario to grasp the menace of this problem gives cause for real uneasiness of mind.

So long as the Dominion of Canada retains its existing political boundaries, a national menace, associated with and arising out of the fuel insufficiency of Ontario, is ineradicable. Ontario never needed a central fuel authority as much as she needs it today, but the future will bring a need still more insistent, and a menace that those who desire to see Canada continue free and flourishing cannot help but view with ever-increasing fear of what it portends.

TORONTO COAL PRICES.

Toronto, May 2.—Demand for coal is still uneven and consumers are buying only to a limited extent. Slack is selling in Toronto at $6.25 to $6.75 and lump at $7.50 to $8.00, Canadian funds, depending on the quality. Smokeless coal is quoted at from $3 to $3.25 at the mines based on New York funds and exclusive of freight charges. Anthracite prices remain unchanged at $11.35 for stove and nut and $11.10 for egg, New York funds.

GOVERNMENT WILL SEND PARTY TO BELCHER ISLANDS.

It is understood that the Dominion Government will send a party to the Belcher Islands, Hudson Bay, this summer to examine thoroughly the iron ore deposits there. It is known that very important deposits have been discovered and that these may form the basis of an iron-mining industry in the far North. Private reports are said to state that large bodies of ore of good grade have been located. It will probably be a part of the work of the men sent north this summer to examine into and report on the methods of getting the ore to market.

EDITORIAL

THE INSTITUTION OF MINING AND METALLURGY LINKS UP WITH THE INSTITUTION OF MINING ENGINEERS.

At the 29th annual dinner of the Institution of Mining and Metallurgy, Mr. Frank Merricks, the president, announced that, at the request of the Institution of Mining Engineers, consideration had been given to bringing about closer co-operation between the two principal mining institutions in Britain, and that henceforward the Institution of Mining Engineers would be housed in the new house of the Institution of Mining and Metallurgy, with union of the libraries and other services of the two institutions under one secretariat and with a joint advisory committee.

Mr. Merricks's remarks are quoted as hopefully significant of many good things for the future. He said:

"The fact that only a few months ago there were "two mining institutions in London with a combined "membership of over 6,000, who were to all intents and "purposes friendly strangers was a regrettable state "of affairs. The fact also that at the end of these few "months it has been possible to remove that barrier, "and to bring the two institutions together, must be "considered a fine and notable achievement. I hope "that in the near future it will be possible to carry co-"operation still further, and to link up the various "mining institutions of the Empire under one imperial "federation. By so doing, the mining profession would "speak with one voice, and with the united power would "exercise great influence on matters affecting the min-"ing industry. With such an imperial federation of "mining engineers, I hope also that in the near future "it will be possible for the president to be drawn from "one of the federated institutions of the Dominions, "with a chairman of the Council in London, and for a "special meeting to take place in the country of the "president of that year. Perhaps this may appear to "be ambitious, but I feel confident that it would be a "great benefit to the mining profession and industry "of the Empire, and I look forward to the day when "that ideal will be fulfilled."

We believe Mr. Merricks has correctly interpreted the sentiment that actuates the mining societies in the Dominions, nor does the history of the past seven years indicate that his vision is too ambitious. There has been a tendency among members of the mining profession to decentralise their energies. It is an ancient and honourable profession, and the concept of Mr. Merricks that the mining engineer should have one voice and should guide his own policies, standing upon his own traditions, is one that will find most hearty accord among those to whom he has addressed himself.

WHAT DO MINING ENGINEERS THINK ABOUT ENGINEERING STATUS LEGISLATION.

The discussion arising from the introduction in the Ontario Legislature of the "Professional Engineers Bill" should serve to draw attention to the fact that the mining engineers of Ontario are being represented as desirous of having such legislation passed. It would be instructive to know what authority there is for such statements. There is no Ontario association of mining engineers and Ontario members of the Canadian Institute of Mining and Metallurgy are not known to be in favor of such legislation. It is true that some mining engineers believe that engineers should be licensed or registered and that they have endeavored to make the provisions of the proposed bill such that it will not meet with very serious objection from other engineers. But there is little evidence that the mining engineers of Ontario are strongly supporting the bill and considerable doubt as to whether they would take any interest in it except for the fact many of the United States are providing by law for licensing of engineers. Mining engineers in their own interest must recognize that such legislation whether desirable or not, is popular and they must see to it that it is made as harmless as possible. It looks as though we might get it without wanting it, or at least without asking for it.

Commenting on the popularity of the licensing laws in the United States, the "Engineering and Mining Journal" says that it finds engineers "lukewarm or indifferent on the subject, and concerned only that the licensing legislation, taken as inevitable, shall be as well planned and thoughtful as possible." Somewhat the same situation exists in Ontario and it will be found that some of the mining engineers who have taken most interest in the proposed legislation have been interested chiefly in having the most objectionable features removed from the draft bill. The mining engineers of

Ontario, as such, have not expressed their opinion.

The editorial writer in "Engineering and Mining Journal" commenting on the question in the United States asks "what does the mining engineer think of the system of licensing?" The same question might well be asked in Ontario. The average mining engineer does not think about it at all.—R. E. H.

MINE PROMOTION LITERATURE IN MANITOBA.

The "Journal" welcomes the comment which appears in this issue from the Commissioner of Northern Manitoba and the secretary of the Gabrielle Mines, Limited, upon critical references in this column to certain mine-promotion literature emanating from Winnipeg.

The Editor believes with Dr. Wallace, and is glad to have Capt. Millican's confirmation, that the mining men of Manitoba (and of Canada as a whole) are overwhelmingly opposed to widespread dissemination of exaggerated mine-promotion advertisements. To put the matter in its lowest terms, it is a natural attitude, because the industry of mining and all connected with it suffers from the repercussion of a lie, and the mining engineer or promoter is not primarily concerned because the credulous investor may be hurt, but because the repute of the industry may be injured.

Dr. Wallace truly says that the future of Manitoba's mining fields depends upon the building up of confidence on the part of investors, and everyone who has followed his work as Commissioner knows that much of the confidence of investors in this new field has been built up by Dr. Wallace himself. It is the desire of this journal, and of the reputable profession that it strives to represent, to strengthen the hands of an administrator in whom the province of Manitoba rightly reposes full confidence.

This journal would be the last to deprecate that genuine enthusiasm which is the prospector's chief asset, and the germ of all mining enterprise. The potentialities of the mineral belt of Northern Manitoba warrant much optimism, and no comment that we have made has been intended to belittle the intrinsic value of the mineral deposits or the future of mining there. Enthusiasm does not tend to fraud, nor did enthusiasm originate the mendacious promotion literature that has come out of Winnipeg. It was prepared with a deliberate intent to deceive, and is remarkable not only for studied inexactitude, but for the steps taken by those who have distributed the literature to absolve themselves from the future wrath of those credulous enough to accept the advertised statements as being true.

The essential soundness of Dr. Wallace's view is expressed when he states: "I have faith—born of knowledge — in the sense of the mining community of Manitoba". So has this paper, and for that very reason it has ventured to draw the attention of the mining men of Winnipeg to false representations concerning Manitoba mines that have had wide circulation outside Manitoba, knowing that to do this would be the shortest way to a remedy.

Not least to be blamed are the newspapers that accept payment for advertisements that are palpably intended to deceive. A well-known Montreal daily gave its readers a sensible editorial recently on the folly of buying oil stocks, advertised by utterly reprehensible and unwarranted statements, but almost simultaneously with the editorial there appeared an oil puff in the advertising columns, an ethical inconsistence that awakens cynicism in the discerning reader. Separated as the editorial and advertising policies of a newspaper may be, yet it is inevitable the uninformed reader should assume that large and imposing display advertisements carry with them the sanction and approval of the editorial staff.

WORKMEN'S COMPENSATION.

Without desiring to criticise the wisdom of workmen's compensation enactments, which stand on our statute books as a reflex of public opinion, and represent one of the advances in social responsibility that mark our times, it is permissible to point out the cumulative nature of the expenditures required. In Nova Scotia, as in Ontario, the history of workmen's compensation has been that of progressive enlargement of the application of the principle that the worker is entitled to be compensated for injuries sustained in the course of his employment out of the revenue raised by the product of that employment. In Nova Scotia the enlargement noted has led to inclusion of occupations that were at first excluded, to larger rates of compensation, to the inclusion of medical aid and nursing, and to increasing cost of administration. It is not probable that this tendency to enlargement will be lessened, and it certainly will not be reversed.

The most satisfactory feature in what the Nova Scotia Compensation Report for 1920 calls a "monopolistic state-board system" is the elimination of all legal expenses and the fact that all monies collected by assessments on the payrolls is paid without diminution — except for administration expenses — to the parties intended to benefit. It is the unnecessary expenditure on litigation arising out of compensation claims that is so distasteful and so harmful a feature of the compensation laws of the province of Quebec, and is responsible for the pressure that is being brought upon the legislature of that province to adopt the system of administration by a provincial board that is now customary in virtually every other province in Canada.

There are so many points on which it is possible for employers to disagree with their workmen, and vice-versa, that operating executives would secretly, if not openly, welcome a system that avoids the necessity for all dispute and all legal recourse in compensation claims. The Board in Nova Scotia is able to claim that it has disbursed compensation assessments raised on an annual payroll of $73,000,000, extending over four years, without expending a cent in solicitors' fees. This is not a remarkable achievement in administration, because it is inherent in the nature of the system, but it is an achie-

vement that stands out in these days of disputation. Once the principle of workmen's compensation is admitted, it is a right and logical procedure to adopt the best method of carrying out that principle, and that is why the appointment of a competent board as paymaster and sole referee has supplanted all other methods, or is about to.

ONTARIO MINE TAX BILL WITHDRAWN.

The proposal to increase taxes on mining companies operating in Ontario has met with so much criticism that the Government might well be doubtful of the result if it were presented for a final reading. It would appear that it had been prepared without very full knowledge of the facts and that its withdrawal means that the Government is now convinced that the mining companies are already making fair contribution to the Provincial treasury, and that the proposal to increase taxes was not well advised.

CORRESPONDENCE.

The Editor,
Canadian Mining Journal.

The Pas, Manitoba,
May 6th, 1921.

Mine Promotion Literature in Manitoba.

Dear Sir:—After reading carefully the various articles and Notes in your Journal of recent issue, with particular reference to Manitoba, I have reached the conclusion that your condemnation of certain promotion practises, while not a whit too severe in particular cases at issue, may be misread to apply to a larger public than the case would actually justify. Not one swallow, nor two, make the summer, nor does one robin, however perky, give us gloomy winter. I am probably in a position to interpret fairly the desires of the great majority of men interested in the mining development of Manitoba, whether in actual practice in the field or in the none the less essential work of attracting capital to the Province for mining development. The general sense of the mining men in the Province is overwhelmingly with you in your position with reference to exaggerated promotion literature. Perhaps you have not given due weight to this fact in your discussion of the Manitoba situation.

For the future of Manitoba's mining fields the building up of confidence on the part of investors, particularly mining corporations, is imperative; without it there will be no progress. It is for this reason that as at least one means of checking untoward movements the "Sale of Shares Act" was put on the statute books and amendments which I was invited to assist in framing have from time to time been added to meet new conditions. It is one of the important duties of the Public Utility Commissioner of the Province to administer this Act and I feel satisfied that any delinquent may be safely left to be dealt with by him. In that connection it is cause for serious misgiving that a resolution before the Provincial Legislature at the present session calling for the abolition of the Public Utility Commission received a majority vote. It is to my mind imperative that this Act be administered, not directly through a government department, but by a commissioner responsible only to the Lieutenant Governor-in-Council and otherwise independent in every sense of the word.

In the long run, however, it is not restrictive legislation, but the good sense of the mining community, that is the most potent factor in eliminating objectionable practices. I have faith—born of knowledge—in the sound sense of the mining community in Manitoba for whom much is at stake; moreover, there are districts in the Province in which the mining men would keenly resent and are in a position justly to resent criticism levelled at the Province at large. For this reason, Mr. Editor, I do not feel that we need attach too much significance to nor give way unduly to despondency into which I confess I sometimes fall on witnessing the vagaries which may now and then afflict the minds of the men who dream of gold mines and the use to be made of them.

Truly yours,
R. C. WALLACE.

The Editor,
Canadian Mining Journal.

Winnipeg, May 3rd, 1921.

Dear Sir,—I note with a great deal of satisfaction your article appearing on page 333, in the Apl. 29th. edition of the JOURNAL, under the caption "Mining in Manitoba." I furthermore wish to compliment your publication on the stand it has consistently taken in regard to what might be termed "wildcat" mining promotions. Furthermore, I am not the only one, nor is the Gabrielle the only mining company in this province, by whom your article have been read with a great deal of appreciation.

Ever since the first discovery was recorded in 1911, we have been steadily endeavouring to develop our particular property through the united efforts of mostly original shareholders from whom nothing has been kept back, and to whom we have never yet issued any reports of a misleading nature, whether reports were, from time to time, good, bad, or indifferent.

Last year we succeeded in raising sufficient capital from the sale of treasury development stock to do a considerable amount of further surface-development work, but, as matters now stand, and chiefly owing to a condition of affairs such as you describe them, we do not feel justified, in fact it would almost be impossible, in placing additional stock on the open market. Consequently we shall be forced to let the property remain more or less idle this summer, although a recent discovery of platinum in small quantities would warrant our proceeding vigorously with additional work in order to honestly ascertain whether there are legitimate hopes of increasing values.

On the other hand, disgruntled stock holders in various companies who have been induced to invest through the medium of lurid advertisements are very apt to take a stand that all mining companies are more or less the same, and the general atmosphere surrounding the mining situation in the Rice Lake district now is not one that would lead our provincial legislators to exert any undue efforts to further the interests of the district generally, although I will say that they have given us every assistance warranted under the existing state of affairs.

However, it is hoped that very soon we may see things considerably changed, and that through the efforts of your own and other publications taking the same decided stand, some sane method of systematic

development may be evolved in this territory where the experienced prospector still waxes very enthusiastic and where additional development is warranted according to all reliable reports which have been compiled to date. To quote further from Prof. DeLury's report referred to in your article above mentioned "In conclusion, it might be stated that the general impression left after an examination of the district is that it will be surprising if in future years the Rice Lake district is found to have no workable gold deposits. The duration of these years will be lessened if a spirit of co-operation is fostered and active steps are taken to check, exaggerated stories and illegitimate promotions, both of which have done the district an infinite amount of harm in the past."

The writer had the pleasure of meeting Prof. DeLury last summer on his trip through this district, and the impression gained was that he was quite sufficiently impressed to warrant even a stronger statement, which we all hope time and honest endeavour will amply justify.

It may be of interest to your readers to know that further steps are now contemplated by both the federal and provincial governments to greatly improve the methods of summer transportation which have, to date, been a great draw-back to the whole of the district. It is hoped that, very soon, a waterway will be established via the Hole (Wanipigow) River which will be accessible for power-launches and barges from a point above the old government dam near the mouth of this river, to which point freight can be transported over a proposed new wagon of truck-road from Bad Throat, where there is now sufficient depth of water to allow of Lake Winnipeg boats landing.

Yours truly,
CHAS. A. MILLICAN.
Secretary, Gabrielle Mines Ltd.

MR. R. R. ROSE GOES TO THE HOLLINGER.

The Bulletin of the Canadian Institute of Mining and Metallurgy for May contains the following announcement regarding Mr. R. R. Rose:

"This month the Institute loses the services of Mr. R. R. Rose, who has left Montreal to accept a position at the Hollinger mine. Mr. Rose was appointed Acting-Secretary of the Institute in October, 1919, at the time Mr. H. Mortimer Lamb was forced, through ill-health, to relinquish his position as Secretary. Taking charge of affairs at somewhat short notice, Mr. Rose at once proved himself a man of unusual all-round ability, and the Institute owes him a deep debt of gratitude for the part he played in assisting it through a most difficult transition period. Mr. Rose, however, is essentially an out-door man. The mine appeals to him more strongly than the office, and he has been unable to resist the call. We take this opportunity of assuring Mr. Rose that every member of the Institute, and especially all members of Council, who are in the best position to judge, deeply appreciate his valuable services to the Institute, and wish him every success."

The part played by Mr. Rose as Acting Secretary of the Institute is not at all overstated in the Bulletin. Undertaking duties that were entirely strange to him, during a very difficult time, Mr. Rose was observed by those who visited the headquarters at Montreal to be a capable and conscientious officer, modest as regards his work, but efficient in its carrying out, and the "Journal" desires to add its wishes to that of the Bulletin for his success in new employment.

PERSONALS.

Mr. Jas. J. Denny of Cobalt, who has distinguished himself as a metallurgist and made many contributions to improved practise in treating the silver ores of the Cobalt area is to be granted this week by Queens University the honorary degree of M.Sc. Mr. Denny is on the staff of the Nipissing Mines at Cobalt.

Among those who receive this week from Queens University the honorary degree of LL.D. are R. W. Brock, geologist and C. V. Corless, mining engineer. Mr. Brock is Dean of the University of British Columbia and was some years ago Director of the Geological Survey of Canada. Mr. Corless is manager of Mond Nickel Co. and is president of the Canadian Institute of Mining and Metallurgy.

Mr. A. H. Low, Mr. G. H. Thomas and Mr. Harry Dakes of the Mackenzie River Oil Company have left Toronto for Edmonton and the oil fields.

Mr. Robert E. Hogan representing the Palatine Mining and Development Co. is at Port Arthur. It is reported that his company has purchased and will operate the Atikokan blast furnace at Port Arthur.

Mr. O. S. Finnie, administrator of the Mackenzie River Oil territory has a party of geologists, surveyors, engineers and civil servants at Edmonton making preparations for a trip down the river.

Mr. C. A. Poirier of New York, a mining engineer who is well known in Ontario gold-mining districts is now at Porcupine making arrangements for the carrying on of development work on the Bewick-Moreing properties which have been acquired by the Goldale Mining Company.

Mr. E. P. Mathewson of New York, who was in Toronto for some time during the war in connection with the affairs of the British-America Nickel Corporation, of which he was at that time manager, it at present in London, England.

Mr. J. B. Tyrrell has been awarded a life membership in the National Geographic Society of America in recognition of his contributions to knowledge of geography of northwestern Canada.

GOLD MINING ON THE WITWATERSRAND.

Some interesting data concerning gold mining operations on the Rand during 1920 are contained in the recently issued report of the Anglo-French Exploration Co. There was crushed during the year 24,096,277 tons of ore, producing £42,273,637 gold. The working profit was £11,458,776, or an average of 9s. 7d. per ton. Dividends declared amounted to £8,275,708. The number of natives employed at the end of the year was 159,671. The average price obtained for gold was 112s. 5·6d. per ounce, equal to a premium of 23·3 per cent. The premium ranged from 21 to 50 per cent.

The Anglo-French Corporation has holdings in many South African companies. In Ontario its holdings are in Hollinger Consolidated and Lake Shore mining companies. The Corporation is represented in Canada by Mr. J. B. Tyrell.

The Toronto "Globe" refers to the presidential address at the recent meeting of the Mining Society of Nova Scotia as having been delivered before "a mining society at Halifax." This is a little curious, considering that this particular society has a record of honourable service in mining matters that should at least excuse the use of the definite article, even in Toronto.

Mining Possibilities in Alberta and Adjoining Territory.

A Paper Read at the Second Western General Meeting of the Canadian Institute of Mining & Metallurgy, by Dr. John Allan, Professor of Geology, University of Alberta, Edmonton, October, 1920.

IN discussing the general possibilities of Alberta, it may be permissible to consider not only the province of Alberta, which extends from the 49th to the 60th parallel of latitude, a distance of 750 miles, but also the great northland within the lower Mackenzie basin that is geographically and commercially tributary to Alberta. This hinterland lies between the 60th and 70th parallels of latitude, the latter of which passes through Herschell island.

It is not the writer's intention to discuss all the mineral possibilities in this area or even all the mineral deposits that are known to occur, but he will refer briefly to certain of the minor mineral deposits and discuss more fully the major deposits such as coal, oil, and bituminous sand.

Stretching from the Rocky mountains on the west to the Pre-Cambrian Canadian 'shield' on the east, and from the mouth of the Mackenzie on the north to the gulf of Mexico on the south, lies a belt with low relief. The northern part is drained by the great Mackenzie river system, the southern by the Mississippi system, while the area intervening between these two great drainage systems is drained by the Saskatchewan system. This belt has a width of over 800 miles of the international boundary line, but narrows rapidly towards the north. On the northern boundary of the province of Alberta, the width of the low upland is about 150 miles. A similar type of country widening towards the north, continues down the Mackenzie river. The substructure over this broad area can be roughly described as trough-like with the older formations outcropping along the westerly and easterly sides of the trough.

In discussing the mineral resources and the mineral possibilities in Alberta and the great northland, these general geographical details must be borne in mind, in order to obtain a proper conception of the extent of mineral-bearing formations and the possible occurrence of bodies of minerals.

The writer may here be permitted to emphasise the great need today for more accurate information on our mineral resources. These remarks possibly apply more directly to Alberta, which had an oil excitement in 1914 and is again on the verge of what may materialize into the wildest 'boom' that the province has yet experienced, unless influenced by those technically qualified. Too frequently, incorrect information regarding various mineral deposits has been given to the public or to companies or corporations considering investment.

It is the duty of geological surveys, whether federal or provincial, and of organizations and institutions such as ours, to see that accurate information is given to the public, whether grouped as a company or as readers of the daily press. It is a detriment to the industrial development of a country to have ridiculously overestimated and untrue statements made regarding any particular mineral deposit or occurrence. The time has come when this and similar organizations should impress upon the public that no one is better qualified to give advice on the opening up of a property than a competent mining engineer, no one better able to advise on possible mineral deposits than the trained geologist.

In several instances the development of the mineral resources of Alberta has been retarded by inaccurate statements and representations made to investors by individuals who pose as being technically qualified to give such information. During 1914 in Alberta there appeared several individuals who advertised themselves as geologists although no more qualified in that profession than the average speculator in mineral claims or leases. A similar individual has already made his appearance in Alberta this fall, and it is to be hoped that *bona fide* geologists and mining engineers will use their influence to guard the investor against such persons.

Minor Minerals.

Iron. — Much publicity has been given to statements that there are extensive deposits of iron ore in Alberta awaiting development. If this is the case, they have not yet been found by the geologist. Moreover he does not find the indications very promising. Iron occurs in Alberta in various forms, especially as the oxide, but no occurrences that contain any commercial quantity of this metal have yet been discovered.

In the Crowsnest Pass district there are magnetite shales containing up to 60 per cent metallic iron, but analyses show that they also contain from three to five and one-half per cent titanium dioxide, which is a disadvantage in the treatment of the ore. If a process for treating such an ore can be found, this deposit may prove to be workable.

An endeavour has been made to impress upon the public that there is, in the Sheep River district southwest of Calgary, a deposit that contains "upwards of 2,400,000,000 tons of iron ore" containing 29.9 per cent metallic iron. This information is contained in a report that includes analyses made at the Kingston School of Mines. The writer has investigated this district and finds that there is not a single ton of rock that would be classed as iron ore exposed in the district referred to in the report. The highest analysis from samples which he collected shows 4.5 per cent metallic iron. The writer was also given a sample of hematite by a person who claimed that the specimen came from this deposit. On one side of this sample, "No. 31" was painted in white and the writer proved that it was taken from the standard educational set of specimens sent out by the Geological Survey — this specimen came from the Helen mine in Ontario. This is the sort of information that strong endeavours are being made to suppress, as such erroneous reports hinder rather than encourage the development of our mineral resources.

During the past summer some very good deposits of ochre have been discovered and one of these may prove to be of sufficient size to be worked. Iron ore also occurs on the north shore of lake Athabasca and north of Peace River canyon, but detailed information of these occurrences has not yet been obtained.

Hematite and highly ferruginous red slates occur in the lower Mackenzie basin, below Fort Norman, and

about twenty miles east of the river. In the 1919 Summary Report of the Geological Survey, Dr. E. M. Kindle briefly mentions this occurrence and states that a composite sample contained 12 per cent metallic iron. A single specimen from this deposit that was given to the writer contains 18 per cent metallic iron. Although this is not sufficient to make the deposit workable, it is, however, an interesting occurrence.

Copper. — Several specimens of copper sulphides, chiefly chalcocite, have been brought from that part of the country between Great Slave and Great Bear lakes. The occurrence is worth noting although details are not yet available. A small deposit of chalcopyrite was recently operated for a time on the south side of the Bow valley between Banff and Lake Louise.

Talc. — There are several indications of a valuable though not extensive deposit of talc near Vermilion pass west of Banff. Arrangements are being made to develop this prospect at an early date.

Mica. — There is no mica of importance known in Alberta but a promising occurrence has been found near the head of Peace river, in the vicinity of one of the tributaries. Analyses show that it is muscovite, while optical examination proves it to be of high quality. It is expected that the development of this deposit will be commenced next summer.

Sodium Sulphate. — Alberta encloses upwards of one and a half million acres of water. Many of the smaller lakes contain dissolved salts and an investigation is under way to determine their quality. Just east of the interprovincial boundary, there are several lakes in which deposits of remarkably pure sodium sulphate are found. One of these lakes lies nine miles north of Fusilier and contains about one million tons of pure sodium sulphate (Glauber salt). This deposit is now being operated. Other similar deposits are known both north and south and one deposit of this mineral has already been found in the eastern part of Alberta. There is a large demand for this mineral in the pulp industry as well as a small demand for the salts for medicinal purposes. There are large possibilities for the development of an important industry from these deposits.

Sodium Chloride (Common Salt). — At the extreme northern boundary of the province, salt is being deposited by springs of saturated brine. This material, although pure in quality, is of little value on account of its inaccessibility except to the trading posts at points farther north.

The indications of rock salt to the north of Edmonton were sufficiently promising to warrant a well being drilled by the provincial government at Fort McMurray, at the junction of the Clearwater and the Athabaska rivers. This well is now approaching the salt horizon and indications are becoming more favourable for the discovery of a bed of rock salt.[3]

Major Minerals.

Coal. — Coal is the most important of the mineral resources to date, in that mining operations have been carried on continuously since 1881. The earliest record of the occurrence of coal in Alberta was that made by Sir Alexander Mackenzie in 1789. He refers to a seam of coal that was discovered on the Red Deer river near the mouth of Rosebud creek. This occurrence is at the margin of the present-day Drumheller coal basin.

In making an estimate of the coal resources in any area, it is necessary to determine the areal distribution of the coal-bearing formations, and to estimate the approximate thickness of the coal seams throughout that area. Owing to the importance of coal in Alberta, much detailed work has been carried on by the Geological Survey of Canada. Stratigraphical information has been obtained throughout Alberta, and the distribution of the coal-bearing formations mapped as accurately as the geological knowledge to date would warrant. The information on the coal resources of Alberta has been published from time to time by Mr. D. B. Dowling. In many districts the information that he has published is all that is yet known of the coal resources.

It is not the writer's intention to discuss at this time the origin of coal, but he would emphasize in passing that coal deposits are formed on the lowlands along the shores of seas, inland swamps, or lakes, and, in some cases, in coves and basins on the sea-shore where driftwood has accumulated for geological periods and has been transformed into coal. This last type can be seen today along the shores of Vancouver insland and on the mainland coast of British Columbia. There is reason to believe that the coal seams in Alberta belong to several of the above mentioned types.

In Alberta there are three important coal horizons in the Cretaceous. These horizons are in most localities separated by shale formations of marine origin. There are no Carboniferous coal formations in Alberta and there are no Cretaceous coal seams in eastern Canada. All grades of coal are found in Alberta from lignite of medium grade to high-grade semi-anthracite coals bordering on anthracite. This is a fact that is too frequently overlooked by those discussing the quality of the coal of Alberta. The two most important factors to be considered in discussing coal deposits are age and pressure; both of these factors must be remembered when discussion arises on the coals of Alberta. Furthermore, the quality of the coal in this region is dependent upon these factors. The three distinct coal-bearing horizons in Alberta are:

1. The Edmonton formation, upper Cretaceous.
2. Belly River, middle of the upper Cretaceous.
3. Kootenay formation, lower Cretaceous.

These horizons are separated from each other by formations of from 700 to 3,000 ft. in thickness. The The coal seams in the lower formations are of higher quality than those that occur in the younger formations. This is attributable to the age and to the fact that they have been subjected to pressure from the overlying load for a greater period. On the other hand it is important to remember that the Rocky mountains form the western side of the province, and the mountain-building movements, which have been the cause of the up-building of the mountains have exerted a greater pressure on the coal seams to the west. The quality of a coal, therefore, improves as a seam is traced towards the west and into the foothills or within the front range of the Rocky mountains. The highest grades of coal are, therefore, found near the foothills, or within the front ranges. At the same time, the seams of coal belonging to the Belly River and Kootenay formations are exposed close to the mountains or within the mountains, owing to the fact that the beds have been tilted upwards in the process of mountain building. There are several coal basins in Alberta, widely distributed, and yet all

[3] Early in November a bed of transparent rock salt, at least 14 feet thick, was penetrated by the drill at a depth of 648 feet. Plans are being made for more extensive development in the spring of 1921.

are producing coal. The grade and quality of the coal in these individual basins vary, but in general it may be said that the higher grades are found towards the west. There are other coal basins containing high-grade semi-bituminous or anthracite coals that have not yet been opened up, but they are known to possess large reserves for future use. These undeveloped areas include those at the head of the Highwood and Sheep rivers and towards the head of the Smoky river between the Athabaska and Peace rivers.

Alberta does not contain any large quantity of anthracite coal but small irregular pockets occur within the mountains where portions of the coal seams have been affected by the most intense diastrophic movements.

There is still a large field for investigation of the coal resources of Alberta, both regarding the continuation of coal seams of uniform quality and also on the best methods of preparing the coal for market and of storing coal so that a wider market may be maintained.

Realizing the importance of the coal resources to the province, the provincial government, under the direction of the Hon. J. L. Côté, has instituted a research department at the University of Alberta in Edmonton, in which these and other problems dealing with the coal resources are being investigated.

The importance of the coal resources of Alberta is evident when the amount of this mineral in reserve is considered. It is estimated that Alberta contains 15 per cent of the coal reserves of the world and 87 per cent of the coal reserves of Canada, and that upwards of 96 per cent of the coal reserves of Canada lie west of the Great Lakes. Mining operations began in Alberta in 1881 when 1,500 tons was produced. For the current year, it is estimated that the output will be in the vicinity of 7,000,000 tons. Since the beginning of mining operations in this province, the output has been only a little over 60,000,000 tons. In the 1919 Annual Report of the Alberta Mines Branch, Mr. J. T. Stirling, Chief Inspector of Mines, states that during the last fifteen years, "100,484,038 tons of coal have been affected by mining operations", of which 47,227,498 tons have been extracted and 26,628,770 tons have been "lost without any chance of recovery". This is a deplorable fact and one that calls for immediate consideration and investigation.

Petroleum. — The possible petroleum resources of Alberta are today receiving very widespread attention. On account of the trough-like structure extending throughout Alberta and the Mackenzie basin, to which reference was made in the first part of this paper, there are upwards of 300,000 square miles in Alberta, the lower Mackenzie basin, and western Saskatchewan underlain by formations suitable for the accumulation of petroleum. When one visualises this vast area that contains possible oil reservoirs, one must assume an optimistic attitude regarding the future development in so far as petroleum is concerned. The problem of working out the structure in this area is extremely difficult on account of the scarcity of outcrops, the thick veneer of glacial debris, and the extensive muskegs. Development must of necessity proceed more slowly than if the geological structure could be more readily determined.

The early work of the Geological Survey has assisted greatly in directing the attention of field geologists to certain areas in Alberta and the Mackenzie basin where indications are, at least to a certain extent, favourable.

The stratigraphy of the belt in Alberta and the northland is not unlike that south of the international boundary line where there are today many oil producing areas in Montana, Wyoming and Colorado. However, the structure is more readily determined towards the south on account of the exposures being more numerous, and it is true that the formations have been deformed to a greater extent by tangential pressure exerted by the mountain-building forces. The continuation of these beds into Alberta is just as suitable for the accumulation of petroleum, and the natural occurrence of minerals of any kind is not confined by political boundaries.

The discovery of new petroleum fields is essential if the world's supply of petroleum is to be maintained. The shortage of petroleum is already felt with great acuteness, and while the demand for fuel oil is rapidly increasing, the supply is not keeping pace. We have been recently informed that in this country alone, the Canadian Pacific Railway Company is replacing its oil-burning locomotives by those of the coal-burning type and that a similar change is being planned for its steamships. Today, the United States has about 62 per cent of the world's supply of petroleum, and yet those who have carefully investigated the problem state that the reserve at present mapped out will only last for a comparatively few years. This means that new fields must be discovered outside that country if the petroleum supply is to be maintained. Mexico and Russia include about 20 per cent of the world's supply. With the restoration of peace in Mexico, the production of petroleum will be more assured and will, undoubtedly, increase.

Petroleum was first discovered in Alberta in 1898, in a well drilled southwest of Pincher Creek. Little attention was given to the oil possibilities in Alberta until 1914 when, in May of that year, a strike of light oil of gasoline grade was made in the Turner valley, 16 miles west of Okotoks and 35 miles southwest of Calgary.

This discovery precipitated a boom during which about five hundred companies were formed. Less than two dozen of these companies began drilling operations before the boom 'broke' on the outbreak of war, early in August. Most of the oil companies ceased to exist soon after this disaster and in 1919 less than a dozen were active. About twenty-four drills were at work this season, distributed from the 49th parallel to Fort Norman in the lower Mackenzie basin.

During the summer of 1919, a systematic field search was begun, chiefly by the Imperial Oil Company, and by the Whitehall Oil Company of England.

The result of geological work to date has been that several fields have been outlined in which the chances are greater for finding petroleum. These possible fields are as follows:

1. Southwestern Alberta.
2. Southeastern Alberta (Sweet Grass hills).
3. Okotoks field, Sheep river and Highwood river. This is the only producing field to date. In 1919 the Calgary Petroleum Product Company and the Southern Alberta Company produced 13,000 barrels of crude oil.
4. Central eastern field—Czar, Monitor, Viking, etc.
5. Central western field—between North Saskatchewan and Athabaska rivers within the foothills.
6. Peace river—vicinity of town of Peace River, small quantities of oil have been found with gravity from 12.5 to 17 degrees Beaumé. Between 900 and 1,150 ft.
7. Upper Peace river field in Peace River block.
8. Great Slave lake—western end—oil seepage at Windy point, has a gravity of 16 degrees Beaumé.
9. Lower Mackenzie basin—Fort Norman district.

"Oil struck at Fort Norman, a barrel-a-minute flow", was the first intimation the public had through the press

of the discovery made late in the summer. As is frequently the case, when this report was investigated, it was found to have come from an unreliable source and was not official. The facts are somewhat different from the first report.

During the summer of 1919, the Imperial Oil Company began drilling on the east bank of the Mackenzie river at a point about 50 miles below Fort Norman. Drilling operations were continued during 1920 and at the close of the season a flow of oil was struck at a depth of about 800 ft. The pressure was sufficient to throw the oil some distance above the top of the derrick. The flow, however, was officially reported to be intermittent. Between the gushes, a two-inch pipe was attached to the top of the casing and the well was capped. No accurate measurements were made of the quantity. Indications of oil were obtained at higher horizons in the well.

The oil taken from the well has an olive green colour and a gravity of between 36 and 38 degrees Beaumé. Analysis shows that it contains less than 24 per cent gasoline and about 38 per cent kerosene, the balance being light and medium lubricants. There appears to be no asphalt base present.

The location of this well is about 900 miles northwest of Edmonton and about 1,200 miles by the travelled route. This discovery indicates the occurrence of an undefined oilfield, but there are difficulties that will hinder the development of this area into an oil-producing centre. The prime difficulties are the inaccessibility to transportation, the short summer-season, and the rather severe winter-season. In spite of these difficulties a rush is already under way, and lease-taking parties are now making preparations to go down to the Fort Norman district this winter. The wildest kind of stampede seems to be gathering for the opening up of the rivers in the spring, and it is evident that much 'wildcat' staking will take place during the next year. An aerial service from Edmonton or Peace River is being considered, but it is doubtful if this service will be open to the public.

This discovery is a good indication, but there is yet no need for extreme optimism. The world's petroleum supply is not yet assured. It will require the conservatism of all those who know the facts and the difficulties entailed to tone down the wild enthusiasm that is gathering rapidly.

A second well was begun late this summer by the Imperial Oil Company at Windy point on the north shore of the Great Slave lake, but drilling operations had to cease for the season before any favourable indications of oil were obtained. Close to this point there are several oil springs and pools of oil. A sample of oil collected from one of these pools in 1916, by A. E. Cameron for the Geological Survey had a gravity of 16 degrees Beaumé.

Statements are being made through the press that the Imperial Oil Company is holding back the actual facts. The writer has reason to believe that this is not the case and that this pioneer company is withholding from the public no information that can be expected from any private corporation. Prospecting and development of the possible producing-areas in central Canada has been greatly stimulated by this discovery and progress is assured for the ensuing year.

Bituminous Sands. — To discuss this very important mineral deposit would require more time and space than are at the writer's disposal. It is sufficient to say that in the bituminous-sand formation there is enclosed an enormous supply of oil. The bituminous sands, more frequently called the 'tar sands', belong to the McMurray formation, which F. H. McLearn of the Geological Survey has placed near the base of the upper Cretaceous. This formation consists chiefly of sandstone, saturated with bitumen. The formation covers upwards of 15,000 square miles and reaches the maximum thickness of about 225 ft. The texture of the sand varies greatly from about 20 to 200 mesh. The bitumen content ranges from 12 to 22 per cent with an average of about 15 per cent. Simple calculation will show that there is about 189 cubic miles of bituminous sands in this formation, but only an extremely small portion could ever be utilized. Many tests have been made in which from 15 to 40 gallons of crude oil per ton has been extracted. If even a fair proportion of the bitumen could be extracted, there is sufficient oil to supply the world's demand for over a thousand years at the present rate of consumption.

The real problem in connection with these sands is to find some process which will extract the bitumen from the saturated sands on a commercial scale. Various laboratory processes are known and some of these are patented, but to date none has proved suitable to extract the oil commercially. When such a process is found, a very large reserve of crude oil will be available. Samples of these sands are now being tested at many points in North America, as well as in Europe and in the Hawaiian islands. The chances are favourable for the discovery of some commercial process at an early date. It is anticipated that extensive development work will be carried on in these deposits next season. The problem here is not one of transportation as in the case of the oilfields in the far north, but one of treatment.

UNIVERSITY OF IDAHO OFFERS RESEARCH FELLOWSHIPS.

In co-operation with the United States Bureau of Mines and the Idaho Bureau of Mines and Geology, the University of Idaho offers in the School of Mines a number of fellowships. These fellowships are open to college graduates who have had good training in mining, metallurgy, or chemistry, and who are qualified to undertake research work. The income of each fellowship is $750 a year for the twelve months beginning July 1st, 1921.

Fellows will register as students in the University of Idaho and become candidates for the degree of Master of Science in Mining or Metallurgy (unless this or an equivalent degree has been earned.) Their class work will be directed by the heads of the departments of instruction, but the greater portion of their time will be spent in research work under the direction of the Bureau of Mines staff resident at the University. The purpose of this work is to undertake the solution of definite problems confronting the mining and metallurgical industries of the state of Idaho. For 1921-22 the following subjects are being considered.

(1) Flotation—with especial reference to differential separation of various minerals.

(2) Treatment of the complex zinc-lead ores of the state.

(3) Ore Dressing problems.

(4) Mining problems.

Applications, with certified copy of collegiate record, statement of professional experience, and names and address of three references will be received up to June 1, 1921. The applications should be addressed to Francis A. Thomson, Dean, School of Mines, Moscow, Idaho.

LONDON COMMENT ON CANADA'S RECORD COAL OUTPUT IN 1920.

The following comment from the "Financier" of London, indicates that Canada's coal output in 1920 has excited interest over the seas, and, although the reference to the "provinces of Athabaska, Saskatchewan and Assiniboia' is a little startling at this date, the London writer seems to have sized up the export possibilities of western coal fairly well.

The editorial referred to is as follows:

Statistics now published with regard to the output of coal in Canada in 1920 show a very large increase and a record total, amounting to over 16½ million tons, which is a growth of 21½ per cent. as compared with 1919 and a much larger one in contrast with the pre-war period. Of course, the Dominion is not yet one of the principal world producers, but the industry seems likely to develop rapidly in the future.

Canada has long been known to possess large deposits of this mineral. The richest areas are in Nova Scotia, British Columbia and Alberta. The first named has hitherto had the largest output, owing to its proximity to the sea, but the coal of British Columbia is specially good in quality and has long been popular in California, in spite of the high United States duty. The largest area is in Alberta, which, it is computed, contains about five-sixths of the whole of Canada's coal deposits.

Lack of population has hitherto retarded development in this province, but as it is now attracting numerous immigrants, and as, moreover, there is increasing difficulties in obtaining supplies from the United States, coal mining has recently gone ahead considerably. The increased production of Alberta in 1920 was 38 per cent. as compared with 1919, and last year its output was for the first time larger than that of Nova Scotia.

As Alberta is contiguous to the American mining State of Montana, and as, moreover, the neighboring provinces of Athabasca, Saskatchewan and Assiniboia are steadily developing, there seems great scope for increased coal production, which will, in its turn, tend to promote the flow of immigration and to facilitate greater railway communication. It is thus a fact of great economic importance to the Dominion as a whole.

DOMINION COAL COMPANY'S OUTPUT IN APRIL.

The production from the Cape Breton mines of the Dominion Coal Company in April was 174,969 tons, the smallest output since the strike in 1908, and the smallest monthly production, under normal conditions, since 1905. No. 15 Colliery did not work during April. For the first four months of the year the production was 864,747 tons, which is smaller than for the corresponding period of 1920 by 212,000 tons. The falling off in coal output in Nova Scotia since the first of the year, as compared with 1920, approaches 250,000 tons, and, unless trade conditions improve quickly and materially, it will hardly be possible for Nova Scotia to produce as much coal as was raised in 1920. The production so far for May is probably not greater than two-thirds of full time capacity, and the reduction is much more marked in the case of the larger companies than it is at the smaller mines, largely owing to reduced consumption at steel plants. It is necessary to go back at least sixteen years to find records of coal production as small as at this time.

The effect of the British coal strike has not as yet resulted in any marked improvement in demand, and, in view of the attitude of the transport workers in Britain, it is unlikely that any large direct shipments will be made to Britain, although an indirect increase in demand will certainly result throughout the remainder of the year as a result of the stoppage of the British collieries, and their inability to supply European and other markets. There is, however, a very considerable ability among United States coal producers to supply British markets at this time, and Nova Scotia coal will find it difficult to compete with U.S. coal in the export trade. The price of bunker coal at Sydney has recently been reduced from $10.50 to $8.50 per ton.

PORTABLE MINE-CAR AIR COMPRESSORS.

The Sullivan Machinery Company in its Bulletin 77-A illustrates applications to coal-mining of a portable, motor-driven, air-compressor, mounted on a mine-car truck. The persistence of hand-drilling methods for putting in shot-holes for the removal of coal and rock is one of the reasons why Canadian coal-mines are unable to get the lowest possible production costs, and, in mines where dust and gas render the use of electricity inadvisable at the coal face, there are many instances where it would be safe to use portable air-compressors driven by electric motors, thereby effecting the transference from electricity, with its sparking dangers, to compressed-air near the point of the air, thus getting away from the chief drawback to the use of compressed-air underground, namely, the loss of power in transmission. The operation of hammer-drills is, of course, only possible by use of compressed air, and it is for machines of the percussive type, large and small, that the portable air compressor is designed. The idea might go a good deal farther, however, and include the provision of air-compressors of large capacity, enclosed in a flame-proof chamber, from which coal-cutting and heading machines suited to longwall faces and of rotatory type could be supplied. The combination of the ideal transmission capacity of electricity with the ideal safety advantages of compressed-air should be developed to a much more perfected stage than that of today, and will find its chiefest application where working faces are situated at long distances from the pit bottom, or the point of entrance of the motive power.

U.S. METAL MINE FATALITIES IN 1920 LOWEST ON RECORD.

That fewer men lost their lives in metal-mine accidents in the United States during 1919 than in any previous year for which statistics of accidents have been compiled is shown in a report just issued by the United States Bureau of Mines. The number of men killed was 168 as compared with 646 killed in 1918. The number of men injured was 31,506 as against 42,915 in 1918.

The fatality rate was the lowest on record for the metal mining industry in the United States, and the injury rate was lower than any year since 1914. For every 1,000 men employed during a full time year of 300 working days 3.43 men were killed and 231.18 were injured.

WORKMEN'S COMPENSATION IN NOVA SCOTIA DURING 1920.

The report of the Workmen's Compensation Board of Nova Scotia for 1920 shows that the improvement in the number of fatal accidents disclosed by the 1919 figures has not been maintained. A comparison with previous years, after deduction of fatalities in two coal-mine explosions and a lumber-camp fire, is as under:

	1917	1918	1919	1920
Fatal accidents	146	185	59	81
Deduct disasters	65	105	..	..
	81	80	59	81
Number of Coal-mine fatalities, included in above	97	126	21	28

The total number of compensable accidents in 1920 was, so far as reported, 5649, a notable increase over previous years, particularly in cases of temporary disability, as is shown by the following table:

	1917	1918	1919	1920
Fatal Accidents	146	185	59	81
Temporary disability	4,504	4,504	4,640	5,374
Permanent disability	187	242	250	194
	4,837	4,931	4,949	5,649

The cumulative tendency of compensable accidents is illustrated by this comparison.

Assessment rates were generally adjusted downwards, the Nova Scotia Board having taken no chances in making assessments in the earlier stages of the operation of the Act. Some of the principal adjnstments made were as follows:

	Assessment Rates.		
	1918	1919	1920
Coal mining	$4.00	$3.00	$2.20
Steel & Iron Manufacturing	1.90	1.50	1.00
Building	2.00	1.50	1.00
Stevedoring	4.00	3.00	1.00
Steam Railways	4.50	2.00	1.00
Lumbering, etc.	4.20	4.20	3.80

The cost of administration grows steadily, the ratio of expenses to the total assessments levied being in 1920 8.6 per cent, comparing with 5.76 per cent in 1919, 3.66 per cent in 1918 and 2.58 per cent in 1917. While some growth in this ratio was to be expected the figures of 1920 seem to be excessive.

The investments in the hands of the Board at the end of 1920 total $3,119,026, comparing with $2,233,026 at the end of 1919, all, with the exception of $245,000 of Province of Nova Scotia bonds, being government war-loan securities.

The particnlars of nationalities of injured workmen shows that 4,425 of these out of a total of 4,949, or 90 per cent, were British. This confirms the general belief in Nova Scotia that not more than 10 per cent of the industrial population is non-British. The average age of injured workmen is given as 34 years, with an average weekly wage of $18.57. The nmmber of cases of injury developing sepsis was, in 1919, 122 or 2.6 per cent, which compares with 2.3 per cent in 1918 and only 1.6 per cent in 1917. The increase is in the wrong direction and is rather surprising.

A number of enlargements of the scope of the Act were made in 1920 that will increase the expenditure. Injured persons, from the 1st. of January, 1920, became entitled to free medical aid for a period of thirty days from the date of disability.

The cost of medical aid for the first year was $50,789, but this amount does not represent anything like the full cost of medical aid nnder the Act, as the workmen of the Dominion Coal Company, and of practically all the other coal companies, of the large steel companies, and many other industrial concerns are furnished aid under schemes allowed under the Act. It is stated the medical aid conditions at the coal-mines are not in the opinion of the Board satisfactory, and that conferences are to be held between the operators, the workmen and the Board to formulate new arrangements.

From October 1st, 1920, the allowances to widows and children are increased as follows:

a. Widows from $20 to $30 per month.

b. Children (where there is also a widow) from $5.00 to $7.50 per month.

c. Children (where they are the only dependents) from $10 to $15 per month.

These increases are retroactive, applying to accidents happening in the previous three years and nine months, which necessitated adding a capital snm of $335,748 to the pension reserves, and increased assessment rates in some industries, and prevented their being lowered in others.

The industry where least has been done in the way of accident prevention is the lumbering trade, and the Board signifies its opinion in this respect by the very assessment rate. The Accident Prevention Association is stated to be doing good work, and a snm of $8,320 was expended ont of the Accident Fund in 1920 in forwarding the educational campaign of this Association.

Wages paid in industries coming under the Board totalled $73,000,000 in 1920, some of the chief items being as follows:

Coal Mining	$21,170,000
Steel and Iron Manufacture	9,350,000
Steam Railways	2,090,000
Lumbering and Sawmills	5,800,000
Building (general construct.)	3,570,000

The Board states that it has not incurred or paid one cent for legal fees since the Act came into force.

DOMINION COAL WORKERS' RELIEF ASSOCIATION.

This organization has completed the second year of its existence. It has 6,128 members, an increase of 766 over that of a year ago, and includes 75 per cent of the workmen of the Dominion Coal Company. Receipts for the year were made up as follows:

Members contributions	$83,753
Dominion Coal Company	20,596
Government Nova Scotia	13,546
Interest	4,824
	$122,718

The figures for the year show an excess of income over expenditure and liabilities incurred of about $50,000, and the second year of the Association's life ends with an estimated snrplus, after allowing for incurred liabilities for families of deceased members, of $84,230. Dnring the year, the weekly relief payment was increased from six dollars per week to nine dollars per week for the first six months, from $3.00 per week to

$4.50 for the following six months and from $2.00 to $2.25 per week for the following two years. The revenue of the Association comes from a weekly fee of 25 cents from each member, and a contribution from the Dominion Coal Company of 25 cents per month per member. The Local Government's contribution is based on the quantity of coal raised.

Northern Ontario Letter

THE SILVER MINES.

The Cobalt District.

According to the latest estimates, the mines in the Cobalt district are producing silver at the rate of approximately 6,000,000 ounces a year. In addition to this is about $50,000 a month in cobalt metallics and cobalt oxide. There seems to be fair prospects of this figure being increased, as it is believed the Mining Corporation may make arrangements to resume production. Until official information is forthcoming it will be impossible to include the Mining Corporation in the estimates, and the above figures for the time being remain approximately correct. Should the Mining Corporation get under way, an additional output of silver at the rate of upwards of 1,500,000 ounces of silver annually seems reasonable to expect.

There are approximately four thousand men now employed in the silver and gold-mining industry as found in the district of Temiskaming. An arbitrary division finds about one thousand are employed in the silver mines of which Cobalt employs about seven hundred, while the remaining three thousand are employed in the gold mines. The mines in the Porcupine district are employing about twenty three hundred, while about five hundred are engaged at Kirkland Lake. The Beaverhouse Lake and Larder Lake district account for the balance, and in addition to which are a few men in Skead township and near Matheson.

In all the districts referred to a further increase in the scope of work appears to be assured, while some of the outlying districts promise to become increasingly active. Before the end of the Summer it seems reasonable to expect the total number of men employed in the silver and gold mining industry along the T. & N. O. Ry in the district of Temiskaming will aggregate at least five thousand.

The annual statement of the Trethewey Cobalt will be withheld for a time and will likely be placed in the mail early in June. Unofficial reports tend to indicate favorable results on the Company's Castle property in the Gowganda district. The annual statement is being awaited, however, as it is expected to provide a reasonable means of estimating the measure of success achieved on the enterprise during the past year.

According to telegraphic advice just received from Toronto by the Journal correspondent, the Ontario Government is understood to have passed legislation allowing relief from forfeiture under the Mining Tax Act. It will be recalled that wholesale forfeitures occurred last fall as a consequence of the new Ontario Government enforcing a certain regulation in which all patented mining claims on which a certain tax of five cents an acre had not been paid were forfeited to the Crown. In many cases the claimholders did not know such a tax existed. The Ontario Government came in for very considerable censure and a good deal of injury was done to the mining industry in so much as the impression went abroad that title to land in this province was unstable. In this case, as well as others, the legislation which an amateur government made up of farmer and labor groups enacted has been restrained from providing more than a serious shock and some monetary loss to those engaged in the industry, and the Government has now returned to a more reasonable attitude in allowing themselves to be guided to some extent by those familiar with the mining industry and the manner in which the Mining Act was intended to be administered.

Official announcement is made that the Silver Bullion property in the Gowganda district will be re-opened immediately, and aggressive operations will be carried on. The property has excellent surface showings, and has considerable silver showing underground.

Arrangements have been made to open the Victory Silver Mines, formerly known as the Hylands property, lying in south-eastern Coleman, in the vicinity of the Adanac and Temiskaming. St. Catherine interests are involved. A. Patterson being president and P. E. Hetherington being Sec.-Treas. Work is to be started this week in laying air-pipes, and in pumping out the 200-ft. shaft. J. A. Maevichie, who was connected with the Temiskaming in the early days and more recently with the Cobalt Townsite and the Chambers-Ferland Mines, will be in charge of operations on the Victory. The geology is known to be very similar to the Temiskaming Mine, and encouraging showings of smaltite as well as silver occur on surface.

It is understood that tentative arrangements are being made with a view to re-opening the old Silver Cliff mine by the present owners, one of which is Mr. A. R. Peacock, formerly a partner of the late Andrew Carnegie. The Silver Cliff is known to contain a fair amount of medium-grade ore, and with good prospects of high-grade shoots being found.

At the fifth level of the Bailey Silver Mines, a raise has been put up into the slate formation and a promising vein encountered in which silver values run as high as 1,200 ounces to the ton. In the meantime, the vein found at the beginning of the year at the fifth level is being drifted on with very favorable results. Also, at the fourth level the Big Pete vein has been encountered and is being drifted on. In the present face of this drift the ore is of good trade. The mine is making regular daily shipments to the Bailey Customs mill.

The recent collapse in the market quotations for shares in the "Atlas" property in the West Shiningtree district is understood to be attributed to one of the "insiders" acting contrary to the procedure the manipulators had planned.

It seems as though arrangements were made to stage a stock play on this property of only prospective merit. It is understood that arrangements were made to give an option on treasury shares at something like 10 cents each to certain New York brokers. The option is understood to have also carried several hundred thousand shares at 5 cents each as well as a bonus of 100,000 shares, making the average cost of Atlas shares about 10 cents each to the brokers. All seems to have gone merrily for a time, and the stock soared. Of a sudden however things began to happen and the bottom went out of the market. It appears that as soon as the brokers had completed their plans to make a market one of the "insiders" whose name is well known in promotion circles endeavored to sell a large amount of his stock, thereby causing a collapse.

Conferences have been held, and the "bolter" is expected to be eliminated from the scheme.

Assessment Work Regulations.

In the Act to amend the Mining Act of Ontario

which passed its second reading some time ago, two very important changes are noted. One of these has to do with enlarging the authority of the Mining Commissioner so as to permit this official to deal with all mining disputes whether involving patented or unpatented mining claims. Heretofore, the Commissioner was permitted to only deal with unpatented claims.

The other amendment of importance has to do with the amount of assessment work and allows a longer period in which the work is required to be done. The intent of this amendment has been endorsed by those vitally interested, but the manner in which the amendments appear on the statutes is so ambiguous and in fact so erroneous as to came alarm over the great likelihood of serious diffieulties arising unless the Minister of Mines immediately passes an Order-in-Counеil to remedy the matter.

Heretofore, the Mining Act required a total of 260 days' assessment work to be performed within three years and three months after the date of recording a mining claim. The new amendment to the Act aimed to modify this, and reads as follows:—

Section Two, sub-section One.

"The recorded holder of a mining claim heretofore or hereafter recorded shall, *within five years* immediately following the recording thereof, perform or cause to be performed thereon, work which shall consist of stripping or opening-up mines, sinking shafts or other actual mining operations to the extent of 200 days' work of not less than eight hours per day, which work shall be performed as follows: At least 30 days' work within THREE MONTHS immediately following the recording of the claim, and not less than 40 days in each of the remaining FOUR YEARS, provided that in any one of the said five years 10 days additional work shall be done to make up the total of 200 days."

Just how the first three months, and the following four years are to make up the total of five years is difficult to figure out.

The amendment under section 13 contains the following:

"The application for a patent or lease shall be made to the Recorder within one year from the date before which all work on a mining claim is required to be performed."

It is obvious that a full five years within which to perform the total of 200 days' work is intended, but under the wording of the amendment, all but 10 days work would of necessity have to be performed within four years and three months.

Temiskaming Prospectors.

At a well-attended regular monthly meeting of the Temiskaming Prospectors' Assoeiation, considerable important business was dealt with. Among other things, it was decided to open an office this week in Haileybury in which to provide facilities for attending to the business of the assoeiation.

It was decided to defer action for a time on the objectionable features which certain of the members believe are contained in the bill in Parliament to lend exceedingly wide powers to professional mining engineers.

In connection with other vital matters to the prospectors, the following resolution was passed:—

"1.—That this Association request the Minister of Mines to amend the Mining Act to the effeet, that work performed by prospectors between the dates of staking and recording be accepted as regular assessment work.

"2.—That no timber be sold off mining claims between the date of staking and time of granting of patent, and that all timber then becomes the property of the patentee.

"3.—That the discovery clause in the Mining Act be struck out and that prospectors be granted claim upon making application for mining land.

"4.—That the Minister of Mines be requested to use his influence with the T. & N. O. Commission, to procure for bonafide prospectors, who are members of this Association, special reduced passenger-rates over the lines of the T. & N. O. Railway.

"5.—That the Minister of Mines be requested to use his influence with the T. & N. O. Commission to procure, for prospectors, a reasonable freight-rate for small quantities of explosives between different points on lines of the T. & N. O. Railway, at regular intervals."

THE GOLD MINES.

The Porcupine District.

One of the outstanding developments in connection with the mining industry in the Porcupine gold area has to do with an application made by the Hollinger Consolidated Gold Mines for the right to harness Kettle Falls on the Abitibi river, about 25 miles north from Cochrane. The application has been before Premier Drury, and it is believed will be considered favorably. The Government, it is understood, will reserve 10,000 h. p. for its own use should such be required at any future date. This would leave about 25,000 h. p. available for industrial use. It is not known whether or not the Hollinger intends to proceed at once with the development of this power, but the application is believed to be significant. Heretofore the company in common with the other mines in the Porcupine field has secured its hydro-electric energy from the Northern Canada Power Company, which concern is understood to have contracts with all the mines. This concern is also understood to be increasing its water storage so as to minimize the danger of another shortage during the coming winter. Everything considered, therefore, it would appear as though adequate arrangements will be made to assure a full supply of power for the mining industry in that district.

In response to an offer to purchase the 475,000 treasury shares of the Porcupine V. N. T. Mines at a price well in advance of the present quotation on the open market, an official of that company expressed the opinion that a price of less than 40 cents a share would not be acceptable, and that in his opinion the treasury stock should not be sold at less than par value of one dollar per share. In view of the competition which appears to be developing in connection with a bid to secure a large block of this stock, it is believed quite probable the Porcupine V. N. T. Mines will experience no diffieulty in getting under way within a reasonably short time. The property lies right against the Hollinger and has a series of streng veins which are well mineralized. Official figures show values to be increasing with depth, and on one vein opened to a depth of 600 feet the gold content is $11.50 a ton across a width of twelve feet.

Work on the Allied Porcupine Mines will be on a quite extensive scale. This is a consolidation of the La Palm and the Three Nations properties as well as some other adjoining claims. It is reported unofficially in South Porcupine that Capt. Anchor, formerly identified with the Dome Extension will have charge of the work.

A claim, situated adjacent to the Tommy Burns property in Shaw township has been optioned from Fred

Croteau and J. J. St. Paul to Major B. Harrison on behalf of New York interests.

It is reported in Matheson that a quite comprehensive scheme of exploration and development work will be carried out this year on the Cartwright Gold Mines, some twelve miles east of Matheson.

Kirkland Lake District.

Vein No. 2 has been cut at the 600-ft. level of the Lake Shore Mine. Last week the Journal carried an account of value No. 1 being opened up at this depth, and the opening of No. 2 having just commenced at that time. It is now learned that No. 2 vein is exceptionally rich where opened up and this gives the Lake Shore two large and very high-grade ore bodies to develop at the 600-ft level. By reason of these favorable results the company will now immediately enlarge its 60-ton mill to 100 tons daily. Furthermore, just as soon as the requisite amount of development work is done, the question of installing a much larger plant will be taken up.

It is learned on good authority that the bond holders of the Teck-Hughes Gold Mines intend to be reasonable, and an adjustment of the financial affairs of this company is probable at a very early date. The physical condition of the mine has greatly improved and the work is highly efficient. The enterprise is now on a profitable basis of operation and a good future seems to be assured.

A deal for the Kirkland Townsite property is being negotiated and the indications appear to be that this property will be under operation within the next few weeks. The claims lie adjacent to the Wright-Hargraves Mines.

The Kirkland Lake Proprietary has established its main office at the Tough-Oakes Mine, having formerly been located at the Chambers-Ferland mine at Cobalt. This concern is gradually shaping its course and the mine will be under operation on a quite large scale before the end of this month. It is hoped to have sufficient ore developed to re-open and operate the mill at full capacity by late summer.

At the 100-ft. level of the King-Kirkland Gold Mines, drifting operations have opened up additional ore. The pay streak is about fifteen inches in width and the values range from $10 to $25 a ton. This is regarded as excellent encouragement at this early stage of exploration.

The directors of the Miller Independence Mines have decided to make a bond issue of $50,000, maturing in three years and carrying 8 p.c. interest. The company has placed 150,000 shares aside in its treasury and gives the purchasers of bonds the right to exchange bonds for this stock, at any times before maturity, on the basis of three shares for each dollar held in bonds. By this method it is planned to finance the carrying on of extensive diamond drilling operations and complete the general scheme of exploration underground.

MONTREAL METAL QUOTATIONS

Following are fair average prices for ingot metals (in less than car loads) at Montreal:

	May 5	May 12
Copper, Electro	17½	17½
Copper, Casting	17	17¼
Tin	38	39
Lead	6¾	7
Zinc	7¾	8
Aluminium	31	33
Antimony	7½	7½

TORONTO MINING STOCK QUOTATIONS.

Quotations on Active Stocks on Standard Stock Exchange Quotations for week ending 7th April 1921:

	High	Low	Last
SILVER			
Adanac Silver Mines, Ltd.	1⅜	1⅛	1⅛
Beaver Consolidated	35	32¼	32¼
Coniagas	1.80	1.75	1.76
Crown Reserve	12½	12	12
Gifford	⅞	⅞	⅞
Great Northern	2	1¾	1¾
Hargraves	1¼	1	1
McKin.-Dar.-Savage	17	17	17
Mining Corp. of Can.	.85	.85	.85
Nipissing	5.25	5.00	5.15
Ophir	1	1	1
Peterson Lake	6½	6⅛	6⅛
Silver Leaf	2	1¼	2
Temiskaming	20	20	20
Trethewey	19½	16	16
GOLD			
Apex	1¾	1¾	1¾
Atlas	19	10	19
Argonaut Gold	38	34	38
Boston Creek Mines	9	9	9
Dome Extension	75	75	75
Dome Lake	33¼	31½	31½
Dome Mines	22.70	21.10	21.10
Gold Reef	37⅛	33⅛	31½
Hollinger Cons.	7.30	7.22	7.23
Hunton Kirkland G. M.	9	9	9
Keora	15	12½	12½
Kirkland Lake	54	50½	50½
Lake Shore M. Ltd.	1.38	1.28	1.32
McIntyre	2.05	1.99	2.03
Moneta	14	12	13
Newray Mines, Ltd.	7½	7	7½
Porcupine Crown	28	24	28
Porcupine Imperial	1	1	1
Porcupine V.N.T.	20	19¼	19¼
Preston East Dome	3⅞	3⅞	3⅞
Schumacher	24¼	23	23½
So. Keora	33	30	32
Teck-Hughes	18	16¼	16½
Thompson Krist	9	7½	7½
West Dome	8	7⅜	7¾
West Tree Mines Ltd	3¾	3½	3½

TORONTO COAL PRICES

Toronto, May 11. Demand for coal is picking up a little but generally speaking, the soft coal situation is about the same. The number of idle cars is being considerably lessened and railway earnings are increasing, all of which would appear to indicate that business is improving somewhat. The anthracite situation is described as "tight." It is difficult to obtain stove coal and large tonnages of anthracite have been started to the Lakes which cuts this market off to some extent. Consumers of anthracite are taking hold in better shape in the cities and coal for next Winter's consumption is now being put in freely. The prices in the bituminous market depend largely on the grade of coal. Slack can be bought for from $5.75 to $6.75, lump $5.75 to $6.75, lump $7.50 to $8.00, Toronto, Canadian funds. Standard mine run is $7.50 to $7.75.

British Columbia Notes

THE METAL MINES.

A considerable section of the Clinton Mining Division of British Columbia, known to contain iron ore deposits of importance, was placed under reserve by the Provincial Government about a year ago, it being thought that investigation might prove that deposits could be made to play a vital part in the development of an iron and steel industry.

This reservation was removed recently on the recommendation of Hon. Wm. Sloan, Minister of Mines, the report of Wm. M. Brewer, government mining engineer made in 1919, after a brief and superficial examination—one more thorough being impossible because of the lateness of the season and lack of facilities,—having failed to receive the substantiation of F. J. Crossland, a mining engineer of Vancouver B. C., who went into the district last Summer. He was properly outfitted, made an early start, and so was able to prospect all the limonite occurrences and to furnish what may be accepted as a good approximation of the tonnage available.

Mr. Crossland's report deals with an area of fifteen square miles of the upper part of Taseko Valley. He finds the ore is a secondary limonite and that it occurs as surface deposits following the present contour of the ground. The deposits are patchy and vary from one foot to five feet in thickness. Eight widely separate deposits are described. The McClure Mountain deposit is referred to as one of the chief among those of appreciable size. It contains nearly half a million tons of "positive ore." Whale Mountain contains half a million tons of "probable ore". The total of "positive ore" in eight deposits is placed at 672,741 tons and "probable ore" at 911,250 tons. The ore is homogeneous and is a good grade of iron ore, averaging 50 per cent iron with no impurities that would affect its value as a supply for blast furnaces. The deposits consist of a number of widely separated aggregates.

While Mr. Crossland was proceeding with his work a party headed by Mr. Mackenzie, of the Canadian Geological Survey Branch, Ottawa, was engaged in making an investigation on behalf of the Ottawa Department of Mines. This party took up both geological and topographical work and Mr. Mackenzie's report is being anticipated with considerable interest.

It would appear from Mr. Crossland's report that the ore tonnage of the area placed under reserve is not sufficient to warrant the installation of the equipment necessary to mine out the ore beds. The scattered nature of the deposits, and the difficulties of transportation, are factors that make their economic exploitation impracticable at present.

The "bona fide mineral prospector" is to be assisted by the provincial government to obtain cheap powder for the development of mineral properties. At the last session of the legislature $10,000 was voted for this purpose and Hon. Wm. Sloan, the Minister, has approved of regulations to govern the distribution of this fund. Twenty-five per cent of the legitimate cost of the powder at the point of purchase is to be granted in the form of a rebate. Applicants must prove to the satisfaction of a Mining Recorder or a Mining Engineer employed by the government that they are "bona fide mineral prospectors". Rebates will be allowed on a basis of not more than ten cases of powder to each applicant in one year, except where "exceptional circumstances" are proven and on the "written recommendation of the Resident Engineer of the Department of Mines." Applicants are required to sign declarations, upon forms supplied by the Department of Mines, setting out the legal definition of the ground on which powder has been used and the number of cases of explosives actually used in prospecting such ground and an invoice of the powder purchased must be furnished. To make the conditions clear: if powder is bought in centres where it is comparatively cheap, the rebate or subsidy will be based on such cost; if it be bought at outlying points at a higher price the percentage will be figured on the higher cost. This is considered to be more of an advantage to the prospector than would be a straight rebate per case of powder.

Without a profitable market for their products the mines of the eastern districts of British Columbia are going through a period of gloom. There are properties in the Slocan and other sections of the Province that have not shipped for a year and on the dumps of which is stacked ore which, under normal conditions, would be bringing satisfactory returns. Every cloud is said to have its silver lining and the warm glow in this case is the change of attitude of the metal miner and the working man.

Not long ago the operators of the Slocan were in the throes of a strike called by the organization known as the One Big Union, an organization of the same stripe as the Industrial Workers of the World. The mine owners, although the market permitted operation if there were no unreasonable increase in costs, vigorously combatted those responsible for the demands made upon their resources. Thus they lost a season of fair weather in world conditions. When they had succeeded in overcoming the menace of the One Big Union it was found that the general slump in metal quotations, which has ever since been in effect, had developed.

In May, 1920, an agreement was entered into between the Mine Operators of the Slocan and the International Union of Mine, Mill and Smelters Workers of America and Slocan Lake Union, No. 98. This provided for a generous scale of wages, miners receiving $5.75 per day, muckers, $5.25, timber-men, $6.25, timber-men's helpers, $5.75, blacksmiths, $6.25; blacksmith's helpers, $5.75; carpenters, $6.75 and so forth. A uniform rate of $1.50 per day was fixed as the company charge for board and lodging.

A clause of this agreement of exceptional interest reads as follows:

"In-so-far as practicable workers seeking employment shall be hired through the nearest local branch of the International Union of Mine, Mill & Smelter Workers, the Mining Companies through their representatives and foremen, however, reserving the right to hire any person holding membership in the I. U. of M. M. & S. W., or desirable persons who are not members of the I. W. W. or O. B. U. In every instance workmen holding membership in the I.W.W.—O.B.U., or any other labor organization not eligible to membership in the American Federation of Labor, shall renounce their allegiance thereto and, as evidence of such renunciation, hand over their membership card therein and agree not to be come members of any of the said labor organizations while in the employ of the

Company. The mining companies agree to afford every facility to organizers or agents of the I. U. of M. M. & S. W. for the enrollment of men in their employ.

Last month (April) the companies of the Slocan came to the conclusion that it would be impossible to pay the scale of wages quoted and continue the working of the mines. As a matter of fact most already had closed down because of the lack of market but it was thought that, if the men would express willingness to take a smaller wage, it might be possible to obtain capital to proceed with development, pending the improvement of outside conditions. Accordingly a conference was called and was held on the 25th and 26th of the month at New Denver, B. C.. Representatives of most of the well-known mines of the Slocan, which include the Bosun, the Rosebury-Surprise, and the Rambler-Cariboo, were present. There also were in attendance delegates representing the International and the Local Unions as well as Mr. J. D. McNiven, Deputy Minister of Labor for the Province.

The decision reached was that there should be a general cut in wages of $1.25 per day, this to be contingent on the men accepting the proposal by vote. At the time of writing, the result of the voting had not been heard but there is authoratively said to be no doubt that the miners and workmen will endorse the arrangement. Thus the future scale of the Slocan will be that quoted as having been arrived at under the contract of May, 1920, less $1.25 per day. On their part the Employers have undertaken to reduce the cost per day of board of lodging from $1.50 to $1.25, so that the total reduction in wages really amounts to $1.00. With the approval of the new scale the rate of wages paid metal miners, muckers, artizans and their helpers in the mining districts of British Columbia will be uniform. What the Slocan metal miners and their co-workers apparently are willing to take is what their fellows in the Consolidated Mining & Smelting Co.'s employ are getting and is what is recognized in other parts of the Kootenays.

A tribute is paid to the Provincial Department of Labor in the agreement being discussed in that it is provided that if, in the quarterly conferences arranged to take place between employer and employees, there should develop differences that threaten to be serious the department's representative, Mr McNiven, shall be called upon to act as mediator in the settlement of such misunderstanding.

Dawson, Y. T.—Reports of the richness of the Mayo Silver Camp continue to be received, the latest being that a nine-foot vein has been struck on the Rico Claim, Keno Hill. This deposit is said to be made up of two feet of high grade galena, giving assay returns of approximately $200 a ton, while the remainder is carbonates quite as rich

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Stewart, B.C.—Work of clearing the right of way for the aerial tramway that will connect the Premier Mine, Salmon River, with tidewater is making good headway. Separate contracts have been let for practically every mile of the 11½ miles, with the idea of speeding its completion. The sites of the towers have not yet been chosen but will be soon when the work of construction will start. The winter trail has softened, which has slowed down shipment of ore.

Some high-grade silver-bearing ore is being rawhided from the Silverado Property located last year and situated on the mountain side about the mouth of Bear River.

Parties of prospectors already are preparing to scatter through the hills back of Portland Canal. Some are setting their steps for the promising country lying further north and known as the Unuk River section.

Alice Arm, B.C.—The situation in this mining community, like that in most of those of a similar character all through America, is at present not too bright. There is some doubt expressed as to the plans of the Dolly Varden Mines Ltd. this Summer. With the silver market at a low ebb and mining costs comparatively little reduced it seems problematical whether the operation of the mine could be made profitable. However nothing certain will be known until the return of A. J. T. Taylor, the president of the Company, from England. Even if no shipping is done it is possible that development will be proceeded with on a considerable scale which would relieve what unemployment there is. In any event, with the opening of the season, there will be many prospectors in the district, development will be undertaken on some of the claims located on the Kitsault and Illiance Rivers, and assessment work must be done on all, so that in a few weeks there will be renewed activity even if there is no marked improvement in the market conditions. Meanwhile some relief has been afforded by the initiation of government road work.

Prince Rupert, B.C.: Shuttle Island, a small member of the Queen Charlotte Group, is witnessing some gold mine development that may become important. Gold was discovered on the beach here in 1918 by workmen engaged in getting out spruce for aeroplane construction. Claims were staked in considerable numbers wherever quartz-veins outcropped. The Ellen Group Gold Mining Company has been opening up one of these properties. They are on one small vein, five inches wide, assaying from $1,100 to over $1,400 in free-milling gold. Another vein, eight inches wide has been located in a quartz ledge, the returns, from which are fully as high. Some very fine nuggets have been found on the beach, doubtless, having been dislodged from the vein outcrops by the wash of the sea.

Nelson, B.C.—The Florence Silver Mining Co., Ainsworth Mining Division, is proceeding with development and piling up some clean ore and concentrate for shipment at some more propitious time. There now are on hand some 500 tons worth, at last year's prices, about $90 per ton. The work of late has had most satisfactory results and it is stated that the property looks as well now as at any time in its history. The vein being prospected is six feet wide between well defined walls and carries as much as three feet of clean galena ore

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Anyox, B.C.—The Granby Consolidated Mining & Smelting Co. treated 200,000 tons more ore in 1920 than in 1919, when operations were hampered by fire and labor troubles. Silver production was increased by 100,000 oz. and copper by 5,500,000 lbs.

Quesnel, B.C.—Placer mining, dredging, hydraulicking, as well as individual, is to take on a new lease of life in the Cariboo judging from reports from that section. Operations are to start on most of the old workings, and on many new ones, as soon as the weather permits. The California-Cariboo Gold Dredging Co., who hold dredging leases on the Cottonwood river, propose shipping in a drill for prospecting purposes.

Cranbrook, B. C.—British Columbia is rich in undeveloped talc properties. For some time there has been a property under development, from which shipments have been made, in the Leach River section, Vancouver Island. There are claims containing the mineral in large quantities and of good quality on the line of the Pacific Great Eastern Ry., near Anderson Lake. Others are to be found in the northern interior. None however, has been worked on a large scale not because of any problem as to mining but no doubt by reason of the joint difficulties of transportation and market. Now comes the announcement that the Fox Talc Property, situated in the Upper Columbia River Valley, has been optioned and that it is the intention to open it up and that plans have been formulated for the marketing of the product. If this is so it is possible that the foundations will be laid for an industry of importance.

Trail, B.C.—The Trail Smelter of the Canadian Consolidated Mining & Smelting Co. received 9,977 tons of ore for treatment during the week ending April 14th. Of this 9,840 tons were from the company's properties. The Blue Bell Mine at Riondel contributed 137 tons. Shipments to Trail thus far this year total 128,038 tons.

Ashcroft, B.C.—The recent discovery of gold near Spences Bridge in the Thompson River Valley has directed attention to the possibilities of mining development. The difficulty of obtaining water in quantity is likely to preclude operations unless backed by considerable capital. Meanwhile the entire alluvial deposit of the section, and a large part of the hillside, has been staked, the latter locations having been made with the idea that some of the quartz outcroppings contain the motherlode. Some development of single claims by individuals is underway and it is reported that good returns are being obtained. Some fine nuggets have been found and single pans are returning as much as 50 cents. The first evidence of larger scale work is the formation of the Hellsgate Mining Company to open up a number of the claims.

Vancouver, B.C.—Interesting figures have been issued recently regarding the business of the Dominion of Canada Assay Office at Vancouver. These show that in 1918 it handled gold bullion to the value of $4,099,595 while last year the total only reached $2,499,174. For the three months ending March, 1921, $394,244 was received as compared with $254,234 for the same period in 1920. While the prospects are that the aggregate for 1921 will be well over that of the previous year it is held that, if all the gold produced by the ores of this Province went through Vancouver, the amount would be much greater. At present large quantities of gold-bearing ore or concentrates leaves the province to be smelted or refined. Some British Columbia properties which produce gold in appreciable quantities, and send it to the United States in ore or in concentrates to be added to the gold reserve of that country, are the Premier, the Hidden Creek Mines of the Granby Consolidated, the Belmont Surf Inlet Mines Ltd. and the Britannia Mines. It it were possible to keep this precious metal in Canada there is no doubt that the receipts of the Vancouver Office would be largely increased, as is illustrated by the effect of the recent renewal on a more extended scale of bullion shipments from the Trail Smelter. Dominion officials, however, declare that the decline in gold production is serious in the United States as compared with the situation in Canada. They state that, while British Columbia's output has declined, the net Canadian production has increased and, from indications, will make rapid strides this year.

Dr. M. Y. Williams, has been appointed to lead a party of fifteen into the Mackenzie River District this summer, on behalf of the Canadian Geological Survey. He and his associates will be engaged in a geological survey of the region. They will leave Edmonton on the 15th of May. There are to be three other parties from the Canadian Geological Branch in this country during the open season, one of which will be headed by Fred V. Seibert who is to make a topographical survey of the Mackenzie River oil district. J. A. McElhanney, assistant controller of surveys, is in Edmonton arranging for the season's work.

Victoria, B.C.—D. C. Coleman, vice president of the Canadian Pacific Ry. Co., when on the Coast recently informed Wm. Sloan, Minister of Mines, that a substantial sum had been appropriated for the prosecution of a thorough mineral survey of the Esquimalt & Nanaimo Ry. Belt, Vancouver Island. Messrs. Archibald and Kilburn of the staff of the Canadian Consolidated Mining and Smelting Co. Ltd., are understood to be already making their plans for the season's work. This survey is the outcome of the provincial government's efforts to bring all the minerals in this section under the control of the Province. Under present conditions it is under the joint administration of the railway and the government by virtue of the terms of a subsidy grant made to the E. & N. Ry. Co. some seventy five years ago. The old saw that no one can serve two masters applies here, for the prospectors and mine operators have found it so difficult to obtain title and to work properties within the limits of this belt that development has been seriously hampered. The Company has agreed to the survey with a view to obtaining some idea of the mineral wealth of its Island holdings, in order that negotiations directed towards sole provincial control may be continued intelligently and to a satisfactory conclusion.

THE COAL MINES.

The Coal Inquiry, ordered by the Provincial Government of British Columbia to ascertain why coal costs the consumer in the Province so much more now than it did a few years ago, is at an end. Witnesses representing the coal companies, the coal distributors, the general public, as well as some outside engineers, were examined. The books of the Canadian Collieries (D) Ltd. and the Canadian Western Fuel Company were thrown open to the chartered accountants appointed by the Commissioner and the costs of those in control of the dealers' end of the business in Vancouver and Victoria were closely scrutinized.

This investigation was granted after sustained agitation centering chiefly in the City of Vancouver. It

was backed up by the City Council of that City. It will, there is no doubt, cost the ratepayers of the province a considerable sum. What results will be achieved remains to be seen. The reports of the Commisioner, the coal mining engineer chosen to conduct the technical side of the inquiry, and the chartered accountant, have not yet been released by the Minister of Mines. But from all reports, it is not likely that much new light will be thrown on the British Columbian's problem of obtaining cheaper coal. F. T. Congdon, counsel for the public, voiced public sentiment when he observed that it seemed absurd that, with coal in quantities short distances from the centres of population, it should cost $15 a ton. The cost sheets of the operators and the dealers, sworn to by responsible businessmen and apparently unshaken by competent rebuttal evidence, justify the prevailing conditions. Mr. Congdon further gave expression to an acknowledged fact when he said that, with the millions of tons of coal waiting development in old and new fields, British Columbia's industrial future was assured if it could be got to tidewater in quantity and made available for sale at reasonable rates. There is no reason why the coal of the Province should not be so developed sometime but the cost of mining, it would seem, must be reduced and transportation facilities improved before that time arrives.

Mr. Congdon, as a result of his activities before the Coal Commission, has been able to make a number of interesting recommendations relative to the coal business of the Province, which are appended:

1. Abolish the use of the long ton.

2. Require coal operators to furnish monthly returns of operating costs and sales realizations of their several mines.

3. Dealers should be licensed, not for revenue, but to comply with conditions contained in the license safeguarding the public.

4. Consideration of feasibility of collection of stores of coal during the Summer.

5. Tests should be made and published showing the analyses and characteristics of coal from all provincial mines.

6. Dealers should be required to issue regular lists setting forth the different grades of coal, tests relating to them and the uses to which different grades of coal may be best applied, with prices.

7. Consideration of appointment of a fair weights-and-measures officer for the Province and his supervision over similar civic officers and jurisdiction as to grades.

8. Supervision of construction of buildings might include regard to convenience for accepting coal and wood in bulk.

9. Combines which keep up the price of coal should be dissolved and the offenders punished.

10. An enactment to compel operators to furnish coal to any person demanding a quantity not less than one carload of forty tons.

11. Study should be given to the question of introducing uses of coal that would obviate the waste of by-products and the public nuisances now suffered.

12. Consideration of the use of pulverized coal and establishment of central plants for its production, and automatic stokers.

13. Encouragement of interior (British Columbia) mines, which can produce coal at low operating costs and can place it on the market at low cost if railway rates are made reasonable, and endeavor to secure reduction of railway rates.

The coal output of the Nicola-Princeton Fields of British Columbia is to be materially increased. There is no doubt that the production of the Coalmont Collieries will be much greater in the early future than is now the case. The Princeton Coal and Land Co. is proceeding with development and work is either underway or planned in other parts of the district. Regarding the last-mentioned Company most of the damage caused by the recent fire has been repaired, the new tipple again being in shape for work. The old workings of the property have been abandoned temporarily and workings opened up elsewhere. The latter are being driven in a south and slightly westerly direction from the main slope, following the dip of the coal, which varies from 12 to 15 degrees.

The White Lake Collieries have been incorporated with a capitalization of $400,000 to develop some 3,000 acres of coal lands in the vicinity of West Summerland. Slopes are being driven and three seams, described as a first-class blacksmith and steam coal, are being opened up. The output is very limited as yet but will be augmented when the plant has been completely installed. It is the intention to haul the product to Penticton for use on the C. P. R. lake steamers.

Alexander Sharp, a prominent mining engineer of British Columbia, member of the Canadian Mining Institute, and particularly well-known because of his knowledge of coal-mining conditions in western Canada, has died at Vancouver after a long illness. In the course of a long residence he has been identified with most phases of mining development in this Province and was highly respected.

LATE AMBROSE MONELL.

Word reached Toronto last week of the death in New York of Mr. Ambrose Monell, who for some years has occupied a conspicuous position in financial affairs in Canada and the United States, and whose death has caused general regret among his business associates. The late Mr. Monell was the first president of the International Nickel Company and it is the testimony of Toronto officials of the company that under his regime as chief executive the company achieved a dominant place in the nickel industry of the world. The International Nickel Company was formed in 1901 and it took over as a subsidiary the old Canada Copper Company which had been operating since 1887. Development and expansion rapidly took place until by 1905 the Ontario production of the company, together with that of the Mond Nickel Company outstripped that of New Caledonia. Mr. Monell was 29 years of age when he was called to the presidency of the International Nickel Company, following a thorough grounding in the steel industry in the United States. He brought a wealth of native ability to the task of developing and furthering the company's interests and his subsequent career of a successful administration proved him to be a great organizer and executive. It required much faith and money to break into the then new Porcupine field because Hollinger at that time was not looked upon as a world beater, but it was the late Mr. Monell who took the first option on the Dome Mines property and played no small part in its development and prosperity.

The late Mr. Monell resigned his position as president of the International Nickel Company in 1917, to enter the United States Aviation Corps, he having charge of the aviation program of that country after it entered the war. He went to France with the rank of Colonel. He returned from France suffering from a nervous breakdown and for the past eight months had been in a sanitarium, his condition gradually becoming worse until death came to him at the early age of 48 years.

At the time of his death he was Vice-President of the International Nickel Company, a director of the International Corporation, of Midvale Steel, of the Liberty National Bank, of the Bankers' Trust Company, International Motors, and some other concerns.

Among his achievements is to be mentioned the fact that some years ago while with the United States Steel Corporation he invented the formula for alloying steel known as the Monel process.

He was a graduate of Columbia University, from where he went to the United States Steel Corporation as metallurgical engineer. He was shortly afterwards made assistant to the President, which position he resigned to accept the Presidency of the International Nickel Company when it was formed in 1901.

The late Mr. Monell spent several months in Northern Ontario and British Columbia in search of health and also spent some little time in Toronto. He was a man of great energy and enthusiasm and had the faculty of inspiring his associates with the same qualities that made his own career so successful.

ONTARIO MINING TAX ACT PROVIDES FOR RE-GRADING OF FORFEITED TITLES.

In the amendments to the Mining Tax Act, as finally enacted by the Ontario Legislature, it is a source of considerable satisfaction to the mining industry to note that the clauses increasing the rates of taxation on mines have been deleted by arrangement between the Government and the Opposition, which means that there will be no change in taxation of any of the mines. Clauses 7 and 8 are of interest to mining companies and operators and are given below in full:

7. Notwithstanding anything contained in this Act, lands or mining rights forfeited to and vested in the Crown hereunder since the 29th day of June, 1920, which are not included in a valid subsisting claim under *The Mining Act of Ontario*, or which have have not otherwise been disposed of by the Crown, may be regranted to the owner or lessee at the time of forfeiture, or his heirs, executors, administrators or assigns, upon payment to the Minister on or before the first day of January, 1922, of the amount of taxes, costs, expenses and penalties, if any, which have accrued or have been incurred, or which would have accrued or have been incurred except for such forfeiture, and the sum of ten dollars for each and every parcel of land, but every such grant shall be subject to any lien or encumbrance existing at the time of the forfeiture and shall be so expressed.

8. Where lands heretofore forfeited to and vested in the Crown under this Act have been prior to such forfeiture assessed for school taxes and sold for the nonpayment of such taxes, the Minister may cause an examination of such lands to be made, and where it is found upon such examination and report of an officer of the department thereon, that such lands are in use and occupation for agricultural purposes, or are suitable for the same, and are not valuable for minerals, the Minister of Lands and Forests, upon report of the Minister of Mines, may deal with such lands and dispose of them under *The Public Lands Act* to the purchaser thereof, if any, under such tax sale, or his representatives or assigns, freed and discharged from all claims for taxes imposed under this Act, but every patent issued for such lands shall be subject to any undischarged lien or encumbrance created by such tax purchaser, his representatives or assigns, and the mines and minerals in such lands shall be reserved, and the patent shall be so expressed.

PORT ARTHUR NOTES.

By J. J. O'CONNOR.

The Port Arthur Duluth & Western branch of the Canadian National Railway is undergoing a complete rebuilding preparatory to the carrying of a heavy iron-ore traffic from the Palatine Mining and Development Company's mine, in Minnesota to the company's furnace at Port Arthur. A large gang of workmen are employed in this construction work. The road-bed will be entirely rebuilt, and laid with 80 pound rails throughout its length. There is a link of about four miles to be reconstructed on the Minnesota side, to connect with the Canadian portion of the road, and this work is also underway. Active open-pit mining will be commenced at an early date, and shipments will begin during the coming Summer.

The company's furnace at Port Arthur will be doubled in capacity. This work has been commenced and will be actively pushed to completion. It is the intention to have the furnace in blast before the close of the present season.

Arthur Mitchell, is managing director, and Thomas Krakowiak, of Chicago, is engineer in charge of the mining operations.

It is the intention of the company to build up an extensive iron and steel industry at their plant in Port Arthur.

OIL AND GAS IN WESTERN CANADA.

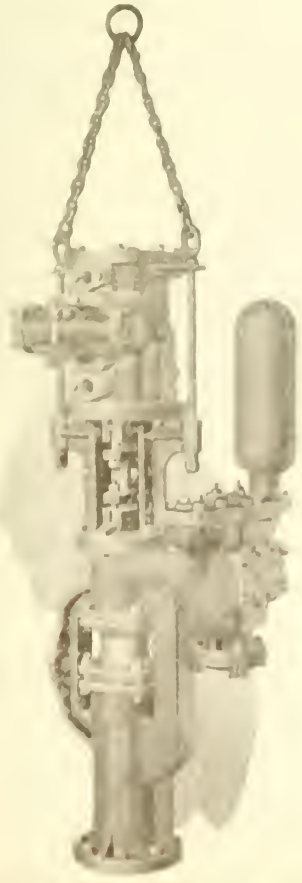
In response to the numerous enquiries that have been received since the discovery of oil in Western Canada, the Department of the Interior at Ottawa has just published a report entitled "Oil and Gas in Western Canada."

This report contains a description of the area, a resumé of the progress of development in the oil and gas fields, a synopsis of the Petroleum and Natural Gas Regulations governing the disposal of rights on Dominion Lands, and information regarding Provincial Legislation and Regulations governing the sale of shares, stocks, bonds, etc. It is accompanied by a map of the oil regions of western Canada showing railways and steamboat routes.

The Board of Public Utility Commissioners for the Province of Alberta, the Department of Mines, and the Mining Lands and Yukon Branch of the Department of the Interior, contributed valuable statistical information which has been embodied in the preparation of this report by the Natural Resources Intelligence Branch, of the Department of the Interior.

That specific and authoritative information on the subject may now be had, will appeal to the prospector, capitalist, and student of conditions in western Canada.

Copies of this report may be obtained free of charge from the Superintendent, Natural Resources Intelligence Branch, Department of the Interior, Ottawa.



THE HEPBURN SINKING PUMP

TORONTO FIRM MAKING MINE PUMP WITH SPECIAL FEATURES.

John T. Hepburn, Limited, of Toronto, has placed on the market a mine pump which is meeting with much favor owing to its special adaptability to mine duty. It is known as the "Hepburn Patent Sinking-Pump" and the feature that strongly commends itself to the mining industry is that the pump is operated without the aid of tappets, levers or any other loose parts. It is very strongly designed, and constructed to withstand the roughest kind of usage without sustaining injury. It is capable of handling gritty water, and is free from extraneous valve-gear lessening its liability to external damage. The pump is certain in action, and always makes a full stroke either under full of partial loads, and the steam piston is perfectly cushioned at any speed or pressure, even without water in the pump.

The ram has only one packing gland instead of two. The pump valves are hard rubber; the pump valve seats, valve plates, stops and springs are of brass. Doors are provided to give easy access to the pump valves and a convenient chain sling is attached for lowering the pump.

Equipment includes air chamber, lubricator, drain cocks and packing for the glands.

PERSONALS

Mr J. J. Ashworth has been appointed general manager of Canadian General Electric Co. Ltd. and Canadian Allis-Chalmers Ltd., Toronto. He has been for several years assistant general manager and now fills the vacancy created by the resignation of Senator Frederic Nicholls.

EDITORIAL

UTILIZATION OF OIL SHALES.

The Fuel Committee at Ottawa has had before it witnesses that have recommended the utilization of oil-shales, of peat, and of electricity developed from water powers, to aid in the solution of the fuel-supply problem in Canada. The necessity to make use of these three potential sources of light, heat and power is greatest where flowing petroleum and bituminous coal are absent, or in insufficient supply. This condition is one that obtains in the provinces of New Brunswick, Quebec, Ontario, Manitoba and Saskatchewan. In these provinces every available source of power supply should be tapped, and even at that, would be found to be insufficient, so far as the three central and most populous of these provinces are concerned. It would be invidious to exalt any one of the three power sources named into the position of a complete remedy for our fuel insufficiency, as even with the aid of bituminous coal from Nova Scotia, and such importations of bituminous coal and anthracite from the United States as the future may see, the requirements of Ontario—for example—will not be so easily met as to induce a feeling of security.

With particular regard to the utilization of oil-shales, history records it as an industry that many years ago had great promise of success, but was killed in Canada, and in the United States, by the discovery of apparently unlimited supplies of flowing petroleum. At one time there were between fifty and sixty oil-shale distillation establishments in the United States, most of which, according to Sir Boverton Redwood, were not more than fairly started when "the discovery of petroleum prostrated the whole business and threatened its projectors with overwhelming loss, from which they were happily rescued by converting their oil factories into refineries."

The oil-shales of New Brunswick and of Nova Scotia, and in particular the "Stellar" oil-shale seam in Pictou were mined for distillation around 1860. About the same date, according to R. W. Ells, the Utica shales in Quebec and Ontario were used for the distillation of oils "until the discovery of the oils of the Petrolia district put an end to the industry."

The oil-shale resources of the United States are believed to be truly immense, but the mineral statistics of 1919 do not record any mining of oil-shales in the United States, notwithstanding the supposed avidity of our neighbours for oil-bearing deposits.

In face of these things, the status of oil-shale utilization is revealed as being entirely secondary to the availability of flowing petroleum and bituminous coal. The situation is made clearer when it is recognised that the coal companies of Nova Scotia are themselves the lessees of areas which contain carbonaceous shales and inferior coals capable of distillation for oil and sulphate of ammonia, and, as was pointed out some years ago, these companies have also "access to large quantities of inferior coals, coaly shales, and screenings, which, at some future date, may very conceivably be found to yield a sufficient percentage of hydro-carbons to justify the extraction of these."

The possibility of making use of the oil-shales of Canada depends chiefly on the availability and the price of petroleum, and it would not seem unreasonable to suppose, in view of the remoteness of the Norman field, that should this vicinity yield petroleum in generous quantity, the delivered cost of such oil will be one with which the distillation of the oil-shales of New Brunswick and of Pictou Co., Nova Scotia ought to be able to compete, having in view the quality and the accessibility of the shales.

In England, the mining and distillation of oil-shales is becoming quite important. This is a reflex of the growing scarcity and cost of bituminous coal, as the existence of the oil-shales has been long known, but up to this date the cheapness of bituminous coal, and the abundance of petroleum imports, has kept the oil-shale industry from developing.

It may further be remarked that the commercial success of oil-shale utilization depends on the completeness of distillation and recovery of valuable constituents, and that if the use of coal were accompanied by the same thorough-going utilization of its constituents the secondary character of oil-shales as a source of light, heat and power would be very apparent. Nevertheless, in a country where bituminous coal is absent, oil-shale assumes a value of the first rank.

The Editor of this journal is accused of having "pronounced" that coal is an absolute necessity for the industrial prosperity of a country. The belief is not a singular one. Prof. Henry E. Armstrong, before the

Royal Society of Arts, recently said: "if we were reasoning beings we should worship coal as our most priceless possession, as the greatest of heaven-sent blessings." The belief is quite common, and the Germans recently took desperate chances with a victorious enemy, because of this obsession.

It would be extremely foolish, however, to deny the necessity we are under in Canada to use every available source of power, coal, shales, peat, water-powers and wood and vegetable fuels. With full utilization of all these we cannot hope to avoid the necessity of importing fuel, but we can do much better than we are doing.

THE BUDGET.

Canadian newspaper comment on Sir Henry Drayton's Budget is virtually identical with English newspaper comment on Mr. Austen Chamberlain's Budget. They are both referred to as "humdrum" and "colourless", and as marking time. Paying debts is not a colourful proceeding, and convalescence after serious sickness is a humdrum and tedious process. A through-going revision of the tariff was, as expected, not attempted. It became evident during the course of the tour of the Cabinet Committee on Tariff that there was much unreality about the whole proceeding, and that the country as a whole was disposed to let well alone. The complexity of the questions raised by the Committee's questionings warranted the assumption that when these gentlemen attempted to make recommendations the task would be found too great, and that this consideration, added to the general state of flux in human affairs, would counsel inaction. In the meantime, the United States has undertaken tariff experiments, trade depression has supervened, commodity indexes and currency discounts have altered international relations, the country does not know whether to regard our national railways as white elephants or wise capital expenditure. Public opinion did not expect, and therefore did not favour, tariff revision at this time, and as Parliament is popularly supposed to reflect the people, everybody should be happy.

So far as the mineral industry in Canada is concerned, it is faced with so many uncertainties that relief from tariff unsettlement is very welcome.

CANADIAN HONOURS.

The recent Convocation of Queen's University was notable in that honorary degrees were conferred upon three representative mining men of Canada, namely, Mr. C. V. Corless, President of the Institute; Dean R. W. Brock, of the University of British Columbia, and Mr. J. J. Denny, of the Nipissing Mine, gentlemen whose contribution to the advancement of science and education is so well known as to render further mention unnecessary.

The compliment paid by Queen's University to the mining profession is one that will be appreciated by them very generally, and in particular by the Canadian Institute of Mining & Metallurgy, which claims all three of the gentlemen honoured as its own members.

The incident serves once more to demonstrate that there is no means in Canada by which service to the nation, in any capacity, can be honoured except by the conferring of scholastic dignities. Canada, by the action of its legislators, is without a central fountain of honour. The necessity for some means by which a Canadian can be honoured in Canada for service to his country is evidenced by the function which the universities have assumed. It is quite evident, however, that scholastic institutions must confine their recognition of national service within traditional limits, and they cannot encroach upon, nor can they adequately fulfill the duty which now and then devolves upon a grateful country of rewarding a citizen by singling him out for titular honour. Canada may be represented, through its legislatures, as a country that yearns after republican simplicity, but it is a land that is neither republican by tradition, actuality, or the opinion of its citizens. Canada is a truly democratic country, and it has always been the desire and privilege of all true democracies to honour individual citizens when the occasion arose. Canada's legislators have deprived this country of access to the traditional fountain of British honours, something that no other Dominion has been sufficiently snobbish to do, but Parliament has provided no substitute to act as Canada's dispensary of honour. By doing so they violate a sentiment that has been engrained in our race since the first warrior was lifted on his shield and acclaimed a hero.

FROTH FLOTATION IN COAL WASHING

This issue contains a paper, taken from the transactions of the Institution of Mining Engineers, describing the adaptation of the selective principle of froth flotation to the preparation of coal for certain industrial purposes, and in particular to fit slack coal for use in by-product ovens to make coke for iron blast-furnaces.

The transactions of the mining societies in Britain have in recent months been rich in records of advances in knowledge of coal substance, and in economic applications of the researches of Stopes, Lessing and others into the separable constituents of coal. Miss Stope's division of the constituents of coal into four substances, separable by mechanical means, and having specific characteristics, has led to search for methods of preparing coal based on selection of the most valuable constituents and on rejection of those containing the largest proportion of undesirable and incombustible substances; and, once more, a line of research that seemed theoretical to the point of fancifulness, has led to definite economic applications.

For example, it has long been held that recovery of all possible fines in coal-washing was a feature to be sought after, and a minimum rejection, or, as it was usually phrased, a minimum loss, in the process of coal-washing was strained after. Dr. Lessing's recent studies on the distribution of mineral matter in coal have led

him to the conclusion that the dust and dirt in unwashed coal consists largely of fusain, which is wholly devoid of coking properties, and yields a small percentage of by-products. The elimination of this dust from washed coal intended for coking would seem desirable, and its reincorporation as fines into the washed product, merely to avoid loss of weight in washing, is shown to be a mistaken policy, if good coke is the desired end. Thus an extremely practical conclusion is the result of pure research that in its inception was not taken altogether too seriously by practical men.

There is an intimation, also, in recent British and American literature on the question of coal substance, that it may be found possible to remove pyrites from coal more thoroughly than has yet been achieved by a washing process, and this anticipation is based chiefly on a clearer understanding of the manner in which sulphur exists in coal substance.

Methods of coal-washing hitherto adopted have depended on a rough-and-ready separation by specific gravity, but froth-flotation introduces great refinement in selection of particles. It has long been recognised that only very fine grinding would make it possible to reject undesirable substances from coal where these existed in a state of fine division or dissemination, but the difficulty has been to treat fine-ground material by ordinary gravity-washers. Flotation would therefore appear to have a future in coal preparation not less important than its place in metal separation, now that it is recognised that coal is a complex ore containing many substances it is desirable to separate and concentrate.

* See "Studies in the distribution of mineral matter in coal", R. Lessing, Trans. Inst. Min. Eng. vol. lx, p. 288, 1920-21

IS COAL CHEAP?

Commenting on the easiness of the demand for coal at this time, the Toronto "Globe" states there is a singular callousness about the future "and a general belief that coal prices will come down. Either the public is sensing the situation correctly or there is going to be a lot of trouble and discomfort later on."

"Coal Age" points out that last year the U. S. public between June 1st and December 31st put into storage 25 million tons of bituminous coal, on which they paid premiums of five dollars or more per ton. "The cost of this coal and of the storage" states "Coal Age" "was of minor consideration in the mad desire to accumulate reserves. It seems fairly clear that the problem of stabilizing the bituminous coal industry largely revolves around a diversion of intense consumer interest in coal at high prices to more interest in coal when it is to be had at lower prices, in order that there may not be the necessity for such high prices."

This is most excellent advice. Bituminous coal will not go any lower at the pitmouth in the United States districts, and, so far as the Canadian buyer is concerned, his only hope of lower prices for bituminous than hold today is in whatever possibility of reduction in freight charges and exchange discount the future holds.

The Toronto "Globe" expresses surprise that the segregation of coal-carrying railroads from coal companies in the United States has not brought down the price of anthracite. No one who understands the economics of the anthracite industry expected such a result, and there is little doubt that the abolition of the working economies which such co-operation made possible will increase all working expenses and raise the cost of producing anthracite. The chief cause for the high cost of anthracite at the mines is the exhausted nature of the reserves, and although there may be some recession in the price of anthracite corresponding to the decline in commodity indexes, yet relative to the index, the price of anthracite will increase with cumulative rapidity as the reserves diminish. The sooner the central provinces of Canada prepare themselves to use some substitute for anthracite the better.

PALATINE MINING AND DEVELOPMENT CO'S. ENTERPRISE.

By J. J. O'CONNOR, Port Arthur.

Robert E. Hogan, representing the Palatine Mining & Development Company, the purchasers of the Atikokan Iron Company's blast furnace at Port Arthur, has arrived in the city, and has opened offices at the furnace plant. He announced officially that all matters pertaining to the acquirement of the blast furnace, from the former owners, had been closed, and that negotiations with the Canadian National Railway management had been satisfactorily concluded, whereby his company are to rebuild that portion of the P. A. D. & W. Railway, between North Lake and Gunflint, a distance of sixteen miles, and from Gunflint to the Paulson Mine, in Cook County, Minnesota, a distance of five miles, twenty-one miles in all. The Palatine Mining and Development Company will operate this portion of the railway under a ten year lease from the Canadian National Railway. The latter company has undertaken to relay with eighty-pound steel, and otherwise put in shape that portion of the P.A.D. & W. Railway between its junction with the C.N. Railway main line, and North Lake, and to have it completed and ready for heavy traffic in two months. In addition to the new steel, this undertaking entails the relaying of the entire distance with new ties, the construction of new bridges, and a general lining up of the road bed.

Mr. Hogan gave out the statement that the mining company would be in readiness to begin the shipment of iron ore over the railway, on the completion of the above undertakings, and that at least two, and probably more, trains of ore would be sent over the road daily.

The daily capacity of the furnace will be 500 tons of ore, when the enlargement now underway is completed. It is the intention of the company to have a large reserve of ore in stock pile at the furnace.

That portion of the railway between North Lake and Gunflint skirts on the shores of lakes for the entire distance, instead of building construction camps, for the accommodation of the men on construction work, the Palatine M. & D. Co. have constructed house-boats on scows, that may be conveniently moved from point to point, as the work proceeds. Labour is plentiful at thirty-five cents per hour, with board and lodging at one dollar per day. It is the intention to have this enterprise fully underway by July 1st next.

The Work of the Honorary Advisory Council for Industrial and Scientific Research

When the Research Council Bill, now enacted, was before the Houses of Parliament, a statement of the work done and planned by the Advisory Council was given to each member of parliament. By the courtesy of a member of the Council the "Journal" has received a copy of the statement, which is herewith reprinted insofar as it pertains to matters of interest to the mining industry. In addition to these matters, the Council is investigating the prevention of rust in wheat, the most suitable method of reforestation in Canada, the prevention of the destruction of concrete by alkaline waters peculiar to the West, the breeding of foxes, utilization of fish-waste, the separation and liquefaction of helium, and a number of other matters, such as fog signalling, materials for insulation of high-voltage electric currents, sulphite-liquor waste, vanadium ores, vitamines, bacterial content of cream and butter, and more efficient methods for heating houses.

The Constitution of the Research Council.

The Research Council consists of eleven gentlemen chosen from the Universities, the Engineering Profession and the Industries of the Dominion, who have been appointed to advise the Government with reference to the best means of applying the great discoveries and advanced methods of modern science to the further utilization of the natural resources of the Dominion of Canada, to the development of new industries in the Dominion and to the extension of those which already exist.

With the intense competition which exists in the industrial world at the present time and which promises to become even keener in future years, those nations which have the resources of science at their command will have, of course, an enormous advantage over those which have not.

This fact has already been so clearly realized by Great Britain, France, the United States of America, Japan, the Commonwealth of Australia and the Dominion of South Africa, that each of these has established a Research Council similar to that now in existence in Canada for the purpose of applying the methods of Science to their industries.

In order that its work may be made efficient over as wide a field as possible, the Research Council has secured the active co-operation of no less than 109 of the leaders of science and industry in Canada who are organized into Associate Committees.

All these gentlemen, with the single exception of the Administrative Chairman of the Research Council, give their services to the Government without payment.

The Manner in Which the Research Council Carries Out Its Work.

The council has been in existence a little over four years. The first year and a half of this period was devoted to the development of its organization, and to a thorough study of the whole field of Canadian resources and industries.

This study showed that certain great problems now face the Dominion which must be solved if the country's industrial development is to be furthered or even maintained.

The council then proceeded to make a detail examination of each of these problems, calling in for purposes of consultation the most expert advice that could be secured. When it was convinced that a problem was one which might be solved, it selected a group of experts, or sometimes a single individual and appointed them to carry out the work, arranging at the same time for the provision of the funds necessary for this purpose. In this way the various investigations were carried out by the men most competent to undertake them and under conditions most favorable for success.

Fuel Investigations.

The fuel problem is one of the most important which Canada has to face.

Enormous sums of money are paid to the United States every year for coal.

All the coal used in Central Canada comes from the United States, and should this supply—for any reason—be cut off even for a single winter, it is well to contemplate what would happen to the people and industries of this part of the Dominion.

The first investigations, therefore, undertaken by the Research Council dealt with the provision of a supply of fuel from Canadian resources to replace that imported from the United States. Tht two following investigations were arranged to this end.

The Utilization of the Peat Deposits in Canada.

The Department of Mines reports that there are at least 37,000 square miles in Canada covered by peat bogs. These bogs are from 5 to 10 feet deep. Many of them lie in Central Canada where there is no coal. About 1-8 tons of air dried peat are equal to one ton of coal for heating purposes. One square mile of peat bog contains an amount of peat equal to 430,000 tons of coal. Attempts have been made at intervals for the past sixty years or more to utilize this Canadian peat, but without success. The best results were obtained by the Federal Department of Mines in their operations a few years ago on the great peat bog at Alfred on the line of the Canadian Pacific Railway between Ottawa and Montreal.

The Research Council after a careful study of the situation decided that it should be possible to cut down the cost of producing air dried peat, and thus put this material on the market at a price which would make it readily saleable. They therefore arranged with the Dominion Government and the Provincial Government of Ontario for the appointment jointly of a Peat Commission, and for the provision of grants for the carrying out of the work of the Commission in question.

The Peat Commission decided to undertake work at the Alfred bog, and have carried on operations there for two summers. They have used a machine similar to that formerly supplied by the Department of Mines, and have designed a new machine of greater efficiency.

They have succeeded in greatly reducing the price of manufacture.

Last summer, they made 5,900 tons of excellent air dried peat at this bog. This was sold under commercial conditions in the city of Ottawa, and in some 25 smaller cities and towns of Central Canada. It was found to meet with a ready market everywhere in competition with coal, and ten times as much could have been sold had it been possible to produce it. Offers were received from individual companies

to take the whole output of the bog. The peat was sold at varying prices, which, however, in every case left a good margin of profit.

The Peat Commission believe that a still further reduction in the cost of production may be made by further improvements in the machines now in use, and in order to bring their work to a final conclusion with a view to the delivery of peat at the lowest possible cost to the community they have asked the respective Governments for a continuation of their grant for another season.

If this is done there is every reason to believe that a great new and profitable industry will in the immediate future develop in Canada as the result of the work of this commission.

The Briquetting of the Low Grade Lignites of South Eastern Saskatchewan.

The only fuel which occurs in Eastern Saskatchewan and Manitoba is the low grade lignite which falls to pieces when mined and has, therefore a very restricted use. This fuel, however, occurs in enormous amount.

The Research Council took up the question of the manufacture of a high grade fuel comparable to anthracite from the abundant supplies of this low grade material. The deposits were visited and a complete study of the whole subject was made with the help of Geologists and Engineers from the Department of Mines, the Commission of Conservation, as well as with the help of other experts who were called in for consultation. This study embraced an examination of the character and extent of the lignite deposits, the possibilities of carbonizing this fuel and the best method of briquetting, the question of suitable binders for the briquettes and all other details of manufacture. Extended experiments were then made on carload lots of the lignite, which resulted in the production of excellent high grade fuel in the shape of small briquettes which are clean, easily handled and convenient to burn. An extended test just completed of this briquetted fuel in comparison with the Pennsylvania anthracite imported into Canada, shows that the briquetted fuel has a heating power practically identical with that of anthracite coal.

Consignments of this fuel have already been supplied to the Prime Minister of Canada and the Premiers of the Provinces of Manitoba and Saskatchewan.

The Research Council, in order to carry out this research, arranged with the Federal Government and with the Provincial Governments of Manitoba and Saskatchewan, for the joint establishment of a Fuel Research Board, under the Chairmanship of a member of the Research Council, and for the provision of adequate grants to enable the Board to build a commercial plant at Bienfait (near Estevan) Saskatchewan, capable of turning out 100 tons of briquetted fuel per diem, the raw material being mined in the immediate vicinity. This plant is now nearly finished, and will be manufacturing this new briquetted fuel next June. The whole plant would have been in operation last August as originally scheduled, had it not been impossible — owing to the conditions in Canada during the past year — to obtain delivery of the necessary machinery for the plant.

There is every reason to believe that this fuel can be placed on the market at a price considerably lower than is now paid in Manitoba and Saskatchewan for anthracite imported from the United States, and that another large and profitable industry will be started in Canada which will at the same time supply the people of this portion of the Dominion with a fuel made in Canada, thus doing away with the necessity of sending millions of dollars to the United States each year for the purchase of coal in that country.

The Use of Canadian Iron Ores in the Place of Iron Ore Imported from the United States.

Realizing that Canada is paying annually millions dollars for steel products purchased in the United States, and that steel plants in the interior of Canada have been dependent on the United States for their supplies of iron ores, the Research Council has, through committees, been making a thorough investigation of the iron ore resources of the country. These researches have been conducted along two lines (one) to determine if our low grade ores could be treated by beneficiation so that they can be used commercially in blast furnace practice, and thus relieve our furnace operators of importing their ores from the United States, (two) investigation of electric smelting methods of our low grade ores.

The committees have accomplished much, and as a result of their investigations have made a preliminary report to the Research Council. They are convinced that Canada possesses large bodies of iron ore which however requires treatment or beneficiation to put it in shape for commercial reduction to pig iron, and also that the time has arrived for this work to be undertaken. The decreasing iron value or content of the Minnesota ores, proportionately increases the value of Canadian ore, and promises to create another Canadian industry in which our transportation systems will take part.

It is hoped during the present year to arrange for a commercial test under actual blast furnace operation of a sufficient quantity of Canadian low grade ores, 10,000 to 15,000 tons, to determine the value and usability of our enormous ore deposits.

Training Research Workers.

By the foundation of Bursaries, Fellowships and Studentships, tenable in Canadian Universities, provision is made each year for the training of a certain number of young gradnates who have shown ability and promise in the methods of scientific investigation, thus providing workers for the prosecution of research in the Dominion.

Education of the Public in the Necessity of Research for the Advancement of Canadian Industries.

Several members of the Research Council have at various times since its establishment visited the important centres of industry in all parts of the Dominion and addressed Boards of Trade, Canadian Clubs and other important and influential bodies, on the value and importance of Scientific Research and the plans of the Government of Canada to meet their needs.

The Need for a National Research Institute in Canada.

While many researches must necessarily be carried out in the field or be located at certain special centres and while others can with advantage be carried on at Canadian Universities, there is a great body of research work which now needs to be carried out in connection with the various industries of the Dominion which is too varied, too elaborate and too technical to be well done in our Universities which are primarily teaching institutions.

The Research Council believes that the time is now ripe for the erection of a National Research Institute

under the management of the Research Council in which the necessary laboratories and appliances for scientific and industrial research — with an efficient staff of workers — will be provided. Such an Institute would be equipped and ready to undertake the study and solution of the great number of special problems and difficulties which present themselves in all advancing industries, and the solution of which is necessary to the highest industrial success. The Research Institute would render to Canada and Canadian Industry the services which are now being given to the Industries of the United States by the National Bureau of Standards at Washington and the Mellon Institute at Pittsburg, although these are planned on a much larger scale to meet the need of a much larger population.

The Bureau of Standards which is maintained by the Federal Government at Washington, employs about three hundred scientific workers and handles the greatest diversity of problems. It tests papers, textiles, structural and other steels, building and roofing materials, cements, paints, inks, chronometers, thermometers, barometers, electrical apparatus of all sorts, radioactive preparations, and in fact anything and everything to which a mechanical, physical or chemical test can be applied. It tests the supplies purchased by the various departments of the United States Government. It has eliminated all fraud in this connection and has saved the country many millions of dollars. It is studying the telephone service, street railways, gas, electric light and power, etc. It furnishes manufacturers' chemists with standard samples of chemicals with which to compare their own product. It is investigating the magnetic properties of iron and steel. It is studying the properties of materials at low temperatures. It is engaged on the problem of standardizing radium. It is carrying on researches in connection with wireless telegraphy. It is conducting experiments on rubber in order to determine, if possible, the relation of its commercial properties to its chemical constitution. It is laying the foundations of an American ceramic industry by its study of native clays.

With the provision of a Research Institute of this type — adapted to Canadian conditions — it is believed that the industries of the Dominion would receive invaluable assistance and direction.

U.S. COAL MINE FATALITY RATE HIGHEST IN WORLD SAYS STATE REPORT.

The coal mines of the United States have the highest fatality rate per 1,000 miners employed of all the principal coal-producing countries, it appears from a table covering a ten year period published in a report of the Safety Board of the State of Washington on the coal mining industry. According to this table the death rate in American coal mines over a period of ten years was 3.74 men killed per 1,000 employed. Great Britain, with almost 50 per cent more men employed in its mines had a rate of only 1·36 men killed per 1,000 employed, and ranks sixth highest in the fatality rate table.

The report on coal mine accidents in the State of Washington shows that fatal accidents have been reduced from a total of 34 in 1918 to 18 in 1920, or from a rate of 5·81 men killed per 1,000 employed to 3·75 per 1,000 employed. Non-fatal accidents have been reduced from 1,116 in 1917 to 502 in 1920.

PERSONAL.

Mr. D. H. McDougall, president of the Nova Scotia Steel & Coal Co., has been appointed vice-president of the British Empire Steel Corporation, in full charge of operations. The business of the Corporation and its subsidiaries is now being conducted in the Transportation Building, Montreal (where the whole of the seventh floor has been taken for this purpose), and the staff of the Dominion Iron and Steel Co. and the Dominion Coal Company has been moved from the offices at 112 St. James St., occupied by them for the past twenty years. Mr. McDougall will have his headquarters in Montreal, and it is understood will reside there in future.

Mr. Roy M. Wolvin, President of British Empire Steel Corporation, is in England.

Dr. W. F. Ferrier, of Toronto, leaves this week for Vancouver. He will be in British Columbia for some time on professional business.

Mr. A. G. Burrows and Mr. P. E. Hopkins, geologists of the Department of Mines of Ontario have left Toronto for Boston Creek. They will spend a month in Skead Township.

Prof. J. W. Russell, of Woodstock, is at Cobalt. He is in charge of development work at the Oxford Cobalt Company's property.

Mr. Balmer Neilly is making arrangements for a meeting of the Ontario Mining Association to be held at Cobalt in June.

A number of McGill University mining students in charge of Dr. John B. Porter, have been studying mining methods at iron mines on the Marquette Range, Michigan.

A large number of mining students from Canadian Universities will be employed by gold mining companies in Northern Ontario this Summer.

Professor Waldemar Lindgren of Boston, a leading authority on gold deposits, will spend the summer in Bolivia.

The American Mining Congress annual meeting and the National Exposition of Mines and Mining Machinery will open in Chicago on Oct. 17.

Mr. S. E. Thompson, consulting engineer for Kirkland Lake Proprietary, Ltd., is at Haileybury. Mr. H. G. Latilla, chairman of the board of directors of the company, is expected to arrive from London shortly.

Mr. A. F. Brigham, general manager of Hollinger Consolidated, has returned to the mine after being in Toronto for a few days.

Mr. S. R. Jones, formerly manager of the Buffalo mine at Cobalt, is on a visit to Kirkland Lake. Interests formerly identified with the Buffalo mine are interested in the Teck-Hughes gold mine at Kirkland Lake, and Mr. Jones has had much to do with the development of the gold mine.

Mr. A. A. Cole, mining engineer of the T. & N. O. Ry. has been visiting mines at Kirkland Lake.

Mr. G. R. Mickle, mine assessor is at Cobalt. He will visit several mines in the north during the next few weeks.

Mr. Wm. Wright, who is interested in several properties at Kirkland Lake, is visiting the mines.

Mr. M. B. Baker, professor of geology at Queens University, will spend the field season in Leeds county, on work for the Ontario Mines Department.

The Importance of the Mining Industry to Old Ontario

An Address to the Toronto Board of Trade, May 3rd, by G. C. Bateman.*

I have been asked to speak to you to-day on the importance of the mining industry to Old Ontario. When we speak of Old Ontario we are covering only one section of the country, and the subject might just as well have been the importance of the mining industry to Canada. However, as Ontario is the richest mineral province in the Dominion, and as it brings things more nearly home to us, I shall deal chiefly with it.

I am afraid that with many of you, knowledge of mining in Ontario is confined to the purchase of mining stocks, some good and some bad, but I have no hesitation in saying that to no body of men is the industry of more real importance than it is to yourselves, and there is no body of men who should be more interested in the industry than yourselves.

Mining is a science which demands the highest ability. Our mineral resources must be developed. Capital and labor must be intelligently directed toward that end. Without this our undeveloped resources can have no value and can contribute nothing to the prosperity of this province.

The two great basic industries in Canada are agriculture and mining. Everyone is so familiar with the importance of agriculture that it is not necessary for me to say anything, yet it may surprise you to know that for the five years preceding the war, of the total tonnage carried by Canadian railroads 35 per cent originated from the mines as against 20 per cent from the farms. The T. & N. O. Railway was projected purely as a colonization road to develop the great clay belt of Northern Ontario, but, for the same period as mentioned above, 44 per cent of the tonnage carried came from the mines as against only 11 per cent from the farms. The American railways report that for the seven years preceding the war 52 per cent of their gross tonnage originated in the mines as against 13 per cent from the farms. While our friends, the Farmers, with a little help from Labor, run the government of this province, we feel that in some particulars at least we can ask them to take a back seat.

The government records show that to date the total value of the metallic production of Ontario amounts to $647,681,000. The dividends paid by successful mining companies from this production amount to $125,000,000 and deducting one from the other we get $525,700,00 as representing the cost of production. The aggregate amount of capital invested is approximately $160,000,000 which gives us a total of $682,700,000 as the total expenditures of the successful companies. However, all companies are not successful, as many of you no doubt are aware, and a very modest estimate of the amount paid out by these latter would be 10 per cent of the above figure, or $68,000,000, giving a total of $750,000,000 disbursed by the industry of this province.

This vast sum represents the money paid out by mining companies of Ontario, for labor, supplies and equipment. A large portion of it has gone to the farmers and business men of Old Ontario. These profitable mining companies have about 250,000 shareholders and these shareholders have received in dividends $125,000,000,000. It certainly does not seem unreasonable to assume that with expenditures by the mines amounting to $750,000,000 that the business men and farmers of Ontario have profited to at least as great an extent as the shareholders.

In considering what the industry means to the province, it is also necessary to mention the collateral benefits which the province derives. Mining is the pioneer industry in the unsettled sections, and it opens the way for others to follow. It provides a ready market for the homesteaders' produce, and labor at those seasons in which he might otherwise be unprofitably employed on his farm. It leads to the development of otherwise useless water-powers and to the opening up of the country and the establishments of prosperous towns and settlements.

Eleven years ago gold was discovered in what is now known as the Porcupine district, but which was then a virgin wilderness, 30 miles from the nearest railway. To-day it is one of the most prosperous and progressive sections of the province and its prosperity and its importance are only in their infancy.

Timmins, with a population of about 6,000, is the most important town, and from the 1920 report of the Timmins Board of Trade the following figures were obtained:

(1) Freight receipts for the year were $725,000 and were exceeded by only one town of equal size in Ontario.

(2) Payrolls amounted to $4,500,000, assessment had reached a figure of $2,225,000 and revenue from taxes, royalties and rates came to $170,000.

(3) Bank clearings for the year amounted to $7,000,000 and were considerably in excess of the best town in Ontario having a population of 10,000.

Prosperous settlements have also been built up in other places throughout Northern Ontario and there can be no question but that the development of the mines has done more to encourage the opening up of the farms than any other single factor.

There also seems to be little doubt but that the mining industry in opening up the country and providing labor centres, has been instrumental in the establishment of extensive pulp industries in this country.

The industry is a great colonizer. The earliest history of Britain is connected with the visits of the Phoenicians in search of tin. Mexico and South America would not have been developed by Spain had it not been for the treasures in gold and silver which these countries possessed. The treasure ships of the Americas sustained Spain in its proud position long after she should have fallen and so profoundly affected the destinies of the world. The discovery of gold and diamonds in South Africa led directly to the Boer War and to the acquisition by Great Britain of one of its greatest colonies. The discovery of gold in California was responsible for the development of Western America and the Cariboo placers in British Columbia was the greatest single factor in opening up that province. The Yukon to-day would probably have been known only to the trappers had it not been for the great gold rush of '98, and coming back to where we started from the discovery of precious metals in Northern Ontario

*Manager of the La Rose Mine, Cobalt, and consulting Engineer of the Bailey Silver Mines.

is directly responsible for the development of that great area.

So far we have considered only the purely commercial aspects of the industry, and while it may not be my province to discuss what some may consider its broader aspects, it may not be out of place to say that the advance of mining and civilization have been intimately connected since the dawn of the world's history. Our modern civilization, our cities and methods of transportation would be impossible without this industry, and so dependent have we become upon it that it is hard to conceive of any single article which we use in our daily lives, in which the product of the mines has not played some part in either its production, manufacture or transportation.

Coming back, however, to the commercial phase, with which, I presume, we are most interested, we will now consider the industry from some of its national aspects, because whatever affects the country as a whole will affect Ontario.

To-day among problems facing the country there are two outstanding ones.

The first is the correction of our depreciated currency, and the second is the solving of our railway problem. We might also say that there is a third, the payment of our national debt, but the solution of the first two will go far toward taking care of the third.

The discount on our money with the United States is due to an adverse trade-balance. On account of our geographical position to that country our trade will always be greatest with it, but it remains with us to change its present direction, and to do that we must find where our adverse trade is largest in products for which this country produces the raw materials. The government returns for the first ten months of this fiscal year show the following imports and exports under certain headings,—

Imports.

Iron and its products	$216,329,442
Non-Ferrous metals and products	48,922,337
Non-Metallic minerals and products	177,213,100
	$442,464,879

Exports.

Iron and its products	$68,657,207	
Non-Ferrous metals and products	40,447,435	
Non-Metallic minerals	35,804,372	
		$144,909,014
Representing an adverse balance of		$297,555,845
or at an annual rate of		$357,067,014

Exchange alone on these items would cost approximately forty to fifty millions.

It is apparent that this indicates an opportunity for improving this condition by the development of our mineral resources. To-day, due to a large measure to the bounty paid for this purpose, Canada has a number of large and efficient iron and steel furnaces, which are a great national asset. Every ton of iron ore, however, that goes into those furnaces is imported. Ontario draws its supply from a friendly foreign country, but imagine what our position would be if that country were unfriendly.

In 1900 Ontario's mineral production was valued at only $10,000,000, and there was comparatively little mining going on in the province. The only operations of any magnitude were in the nickel field and they had, by no means, attained their present proportions. In Eastern Ontario a few small operations were being carried on in a desultory sort of way. Gold mining was in particularly bad odor and it was believed that there were no gold mines of any importance in the Province. In those days the T. & N.O. Railway was just being built, and most of that section, now called Northern Ontario, was practically a wilderness known only to the Indian, the lumberman and the trapper. Yet in 1918 our mineral production had grown to a value of $80,000,000.

Mining had, of course, been carried on in the older portions of the province for many years before 1900, and, as a matter of fact, we find regulations governing the staking of claims back in 1864, when this province was known as Upper Canada. A prospector was then required to stake a mining claim embracing 6,400 acres as against an area to-day of 40 acres. He had to pay for it at the rate of four shillings an acre, and in order that he should not become too wealthy at the expense of the country's natural resources, all rights to gold and silver were reserved to the Crown.

The first important silver discovery in Ontario was made on Silver Islet, a small, low-lying, barren island of only a quarter of an acre in extent, near the north shore of Lake Superior. Almost the first blast carried below the water level, but the island was built up and a prosperous industry established. Prospecting was carried to the mainland and led to the development of a large number of properties and the expenditure of millions of dollars.

The next development was that of the Bruce Copper Mines, where the ore was shipped in barrels to England for treatment. In the early 'eighties the copper-nickel mines of the Sudbury field were discovered, and were first worked only for the copper. The nickel in the ores was at that time a handicap as there was practically no market, but the development of scientific practices for the treatment of the ores, and the expenditure of great sums in developing a market, conditions have been reversed and now the nickel is the important metal, while the copper is a by-product. To-day this industry have been developed into one of vast importance, and this district supplies practically 90 per cent of the world's production of nickel. Last fall there was completed for one of the companies operating in that field a storage dam in connection with their hydro-electric development. I suppose it is safe to say that very few of you have heard of this installation, yet it cost approximately $3,000,000, and is one of the large dams of the world. I believe it is larger than the famous Roosevelt dam in Arizona, of which we have all read. This same company contributes more freight than any other individual customer the Canadian railways have.

The Cobalt camp was discovered in 1913 and is more or less familiar to everyone. While small in extent, it is the richest silver camp the world has ever known, and it contains the largest silver-mines in the British Empire. In 1911, which was the banner year from the point of view of production in ounces of silver, although not in value, Cobalt, with a producing area of approximately seven square miles, had an output of 33,000,000 ounces and was the third largest silver-producing community of the world, being exceeded only by the whole of Mexico and the whole of the United States. Incidentally, to provide Cobalt mines with compressed air, the largest natural compressor in the world was built.

The success attending the development of this rich area led to exploration in other fields, and the develop-

ment of the Elk Lake, Gowganda, Porcupine and Kirkland Lake camps followed. To-day, Canada, through the Ontario mines of Porcupine and Kirkland Lake will this year produce about one-third as much gold as the whole of the United States. In Porcupine we have what is possibly the first, but if not the first, then certainly the second greatest gold-mine in the world.

Ontario also holds an important position with regard to other minerals, and metals, about which we hear less. Through Ontario smelters treating our Cobalt ores we have reached a point where we control the worlds market for cobalt and its alloys and produce 90 per cent of the world's supply.

In Eastern Ontario we have the largest talc industry on the American continent. In the same section there was, a few years ago and probably is still operating, a mine which produced the largest sheet mica in the world, while the feldspar mined north of Kingston sets the standard of quality for America.

From the mining industry thus developed, the province has derived in direct revenue something over $11,000,000, or approximately one-half of the amount of capital expenditure on the T. & N. O. Railway. Practically all of this revenue came from camps in the northern portion of the province, which would lie within a circle of less than 150 miles in diameter. This represents only a very small part of the province and a very small portion of the vast area of pre-Cambrian rocks in which the mines are found, and which lie within the boundaries of the Province.

Ontario, however, is known to have at least 500,000,000 tons of iron ore, although it is of such a character that it needs beneficiation before it can be smelted. Those who are interested in its development believe that a bounty of 50 to 75 cents a ton would make the industry self-supporting and would yield a moderate profit. A production of 1,000,000 tons of ore a year would require government assistance of from $500,000 to $700,000, which may seem a fairly large sum of money for any one particular industry, but it is small in comparison with the $5,000,000 which would have to be paid out for labor and materials to produce this annual output. Is there anyone who would say that the profit to the country from this $5,000,000 of new money would not be greater than the bounty granted?

It is the possibilities of this new money which I want to emphasize and while I have spoken particularly of the iron resources because they run into such large tonnages, the same conditions apply to other metals and minerals, although they would not need to be subsidized. The exploitation of these natural resources is a matter of national importance and should receive the attention of the government, as well as of every man who is interested in the welfare of this country.

We have recently had our attention drawn very forcibly and unpleasantly to the conditions of our Canadian government owned railroads. To correct this condition we need lower operating costs and greater tonnage. The McAdoo award has created one of the worst conditions this country has to face. It affects every man, woman and child in this Dominion. Railroads wages practically set a standard for the rest of the country and we cannot hope to get back to normal until this condition is changed. Its ramifications lead into every department of our industrial life. It not only helps to maintain the high cost of living, but it increases labor costs all over the country and automatically decreases the tonnage which our railroads should carry.

To instance this, we might mention the manufacture of sulphuric acid, which has always been an important industry. Sulphuric acid is very largely manufactured from iron pyrites, of which we have large quantities and during the war, shipments from Canadian mines ran into hundreds of thousands of tons a year, practically all of which went to the States. After the war the demand, of course, fell off, but there has always been a good market for Canadian ores. They must, however be able to compete with Louisiana sulphur, and with the cheaply produced, although low-grade, sulphuric acid from Western zinc-smelters, but if labor and transportation costs are too high, they are unable to do so. That is the condition to-day and Ontario mines, equipped for an output of approximately 250,000 tons a year, are practically idle.

We find this condition affecting even our gold and silver mines. In Cobalt a certain grade of concentrates is produced which, in some instances, costs for marketing alone as much as 35 per cent of the gross value of the product, and in this cost transportation is the big item.

In the last annual report of the Hollinger Gold Gold Mines, all ore below a grade of $6.00 a ton was dropped from the estimate of ore reserves as having no immediate value. A small profit per ton would be sufficient to justify its treatment, and such treatment would result in five dollars for every ton of ore, which is now considered of no commercial value, being paid out for labor and supplies.

During the past two years we have, each winter, faced an acute coal-shortage. Unfortunately, Ontario has no coal, but we have large supplies in the Eastern part of Canada and immense quantities in Western Canada. It might perhaps be too much to ask that this country should become entirely self-supporting in the matter of coal, but there is absolutely no reason why it cannot become much more nearly self supporting than it is at present. It is, however, almost impossible with freight rates as they are, and with wages and working conditions such as our paternal government has forced upon the coal operators of the West, to move coal for any great distance East or West through our own country.

In Ontario to-day we have in our undeveloped mineral resources a great source of potential wealth, which would materially assist in correcting our adverse trade balance, and which could provide immense tonnages for our railroads. Their development would open up the country, establish new industries, give employment to thousands of men and provide a very large market for manufactured goods.

The development of these resources would be of much greater benefit to the country as a whole, than it would be to the owners of the properties. It is very doubtful if in the past the average shareholder has received a return commensurate with the risk involved. This risk itself is large, and in addition to the risk there is the difficulty and expense of establishing an industry in a new country. Roads must be built at private expense, and much material for construction brought from a distance and transported to the ground under financially difficult conditions. Connections to railroads must be financed and power for Hydro-electric plants often have to be provided at

private expense, and all boarding and living houses must be built by the company.

Contrast this with a new company locating, and often subsidized to locate, in an industrial centre where material for construction is obtainable at the door, roads and schools are constructed at the public expense, power is obtainable to a minimum cost, telephone and telegraph connections can be obtained for a nominal sum, and the company is under no expense for housing and boarding its employees.

The people of Ontario own the mineral resources and we sometimes hear it suggested that they should be developed by the Province. Aside from the fact that it is advisable to risk the public funds for the purpose, our present view of Government ownership does not encourage us in this direction. The Ontario Government once undertook to go into mining, but the results were not such that we would wish to see the experiment repeated. It is, however, the duty of the people and the Government of this province to encourage capital to undertake this work, and to see that it is permitted to earn a liberal reward, which is essential in view of the nature of the undertaking.

During the past two decades the value of the mineral production of this province has increased 800 per cent. This is a large increase, yet it does not require much of an optimist, and I am decidedly one of them, to believe that the record of the next few years will far surpass that of the past. To obtain the fullest measure of success, however, it is necessary that we should have from the people, and particularly the business men of Old Ontario, not only a greater knowledge and appreciation of the problems of the industry, but their co-operation as well. With this co-operation and assistance, mining should rapidly take the position to which it is entitled of being the second greatest industry in our country.

LONDON OPINION ON SILVER MARKET OUTLOOK.

Bullion brokers and others in close touch with the silver market admit the difficulty, if not the impossibility, of forecasting the likely course of values in the immediate future.

In conversation with a representative of The Financier, a well-known authority said he would not care to take on the mantle of the prophet and attempt to predict whether the price will rise or fall in the near future.

"The outlook," he said, "is admittedly too obscure and no one can see clearly a day ahead. I think that the price is more likely to fall further than to rise, if only by reason of the growing stocks of the metal here and especially in China.

"As regards China, that country is more likely to be a seller of the metal than a buyer, because of the enormous stocks held there and because of the condition of the export trade and the uncertainties of revival. You will notice that in the past week there has been very little business either way and the price has accordingly been remarkably steady. It looks, therefore, as if buyers and sellers alike have been holding aloof waiting upon developments, but exactly what developments must be left to individual conjecture."

The price of the metal during the course of a week has varied between 34⅝d. and 35d., a variation that has been a somewhat rare phenomenon in this market for a long time past, the fluctuations, as a rule, being much wider. This comparative steadiness is sufficient to show that business has been smaller than usual, the Indian bazaars, generally big absorbers of the metal, having taken little. For a long time the trade has merely purchased, as it were, from hand to mouth, because the jewellery trade is not greatly flourishing at the present time, thanks largely to the obstinacy of the miners.

Supplies have been but moderate, the Continent sending but little to the market, but owing to the recent slightness of demand stocks have increased. It is because of the largely artificial conditions of the market that it is not possible to make any accurate forecasts of the immediate future.

Messrs. Samuel Montagu and Company remark that "if the proposal, forming part of the latest German offer, to hand over some silver as part reparation is ever embodied in the final terms accepted by the Allied Powers, the question will arise whether or no the metal will be placed on the market for realization."—London "Financier."

ENGINEER'S LICENSING MOVEMENT BEING PUSHED IN UNITED STATES.

The movement for licensing engineers has gone further than is realized by most mining engineers. A synopsis of recent legislation as given in the last number of the official organs of the American Association of Engineers notes that the Arizona bill is a law, having been signed by the Governor on March 19; also the Colorado bill, signed by the Governor on April 4, "through efforts of the Colorado Section of Engineering Council." The Minnesota bill has become a law since the writing of the synopsis in question.

On the other hand, the Montana bill, introduced by the A.A.E. chapter, met with the opposition of the Montana Society of Engineers and was killed. The New Mexico bill passed the Senate but failed in the House; and the same fate befell the Missouri bill on March 18. In California a bill sponsored by the A.A.E. was withdrawn from the Legislature. In Nevada, the bill met with the opposition of mine operators and died in committee.

Passing from the distinctly mining states, a bill for this purpose has become a law in North Carolina; in New Jersey the bill became a law April 1; in Indiana on March 10; in Tennessee, on April 19. In Arkansas and South Dakota the bills have failed. In Texas the bill passed the Senate, but failed in the House. In South Carolina the bill failed in committee, "due to opposition from the farmers." Bills are pending in the legislatures of North Dakota, West Virginia, Ohio and Connecticut, being opposed in the latter two states by the Manufacturers' Association. In Pennsylvania, the bill pending in the Legislature is being opposed by various engineering societies in the state, and also by the Scranton Correspondence School, "it being their contention that the law might be construed against the so-called practical engineer." It has passed the House. In New York, there now exists a licensing law, and a fight is on to so amend it as to permit corporation license. In Georgia, Nebraska, and Oklahoma, the movement is being pushed.

We have taken no editorial stand on this important question, but are watching its developments with interest. It behooves all mining engineers to do the same. We know that many are on each side of the question. The rest should ponder, and in their respective states frankly thrash out the merits and demerits of the plan. —Engineering and Mining Journal.

Froth Flotation as Applied to the Washing of Industrial Coal

By ERNEST BURY, WALTER BROADBRIDGE, and ALFRED HUTCHINSON.

(A paper read before the Institution of Mining Engineers, Manchester, September 15th 1920.)

Introduction.—In the autumn of 1919 Sir Arthur F. Pease suggested to the Skinningrove Iron Company that the froth-flotation methods, as practised by Minerals Separation, Limited, for the recovery of fine metalliferous ores from slimes, should be investigated as a possible means for the separation of fine coal from shale and other impurities. The authors accordingly erected at the works of the Skinningrove Iron Company several small washers working under Minerals Separation patents for the experimental separation of crushed coking coals, washery wastes, fine coal-sludges and the like. The object of this paper is to indicate to the members of the Institution the results of the experiments so obtained, and to suggest the importance of this method of treatment to the fuel and metallurgical industries as a whole. The paper will include a short description of the principles of froth flotation, followed by a somewhat detailed account of the operation of the froth-flotation process, and a few remarks on the application of the process to coal treatment in general. Representative results obtained on various types of material will then be included, and the paper will conclude by indicating the economic aspects of the process, especially as applied to the preparation of coal for the production of metallurgical coke.

Principle of Froth Flotation.—When certain reagents are added in small quantities to water, and the whole is agitated violently, a multitude of very minute air bubbles are formed. On allowing the liquid to come to rest, the bubbles do not coalesce, but remain distinct from each other, and rise slowly to the surface, where a more or less permanent froth is formed. The reagents that may be used for this purpose are many and various, and include certain oils (such as turpentine), soluble organic substances (such as cresol), certain alcohols (such as amyl-alcohol), and soaps. The proportion of reagent required is small, amounting in most cases to a fraction of a pound of reagent to a ton of water.

If solid particles are suspended in the water, these particles may or may not become attached to the bubbles; if they do so, on allowing the liquid to come to rest, the bubbles rise to the surface and form an extremely stable froth, in which the solid particles are supported. Particles of metallic sulphide, coal, and graphite can be readily floated by this method; on the other hand, sand, clay, and similar earthy materials do not adhere to the bubbles, and therefore sink to the bottom of the liquid. It follows that, if a mixture of floatable and unfloatable particles in water is subjected to agitation in the presence of a suitable frothing agent, the floatable particles will be included in the froth, while the earthy matter will sink to the bottom. Thus, if coal containing a proportion of clay or similar material is ground to pass a 1/10 inch screen, and the product is mixed with water to which a suitable reagent is added in small quantities, the coal can be separated in a pure state from the clay. If the coal comprises pure coal, carboniferous shale, and clay, the pure coal can be recovered in a pure state, after which, by adding a small quantity of oily reagent, the carboniferous shale can be recovered, the clay being finally left behind.

It should be noted that the froth-flotation process does not depend on the specific gravity of the substance, since some substances (such as galena), which are most readily floated, possess a high specific gravity.

Operation of Froth-flotation Process.—The operation of the froth-flotation process is broadly similar for all types of material treated, and involves the three stages of (1) crushing, (2) flotation, and (3) disposal of products. The details of best practice vary, of course, with the material treated and the type of product required, and the treatment of coal will differ somewhat from that of metallic ores. As the process is now estimated to treat 70,000,000 tons per annum, we can expect considerable help from this sister branch of the industry in rapidly developing the best methods to employ on coal treatment. We have made ourselves conversant with the methods employed in metallurgical practice, and have investigated the question of applying them to coal treatment.

Taking the three stages in their natural order, we wish to explain our conclusions as follows:—

(1) **Crushing.**—As it is already standard practice to crush coal for bye-product coaking, flotation introduces nothing of a revolutionary character in this respect. The material should be crushed to a degree sufficient to ensure—

(a) That the largest particle of floatable material is sufficiently small to be held in the froth; and

(b) That the floatable material is freed sufficiently from adhering waste for efficient separation to be possible.

In cases where the valuable material and the waste occur distinctly separate as large crystals or broad bands, (a) will be the deciding factor; whereas fine and intimately-associated crystallization or narrow stratification render (b) most decisive. The process treats the finest as well as the coarsest floatable material, and no classification of the crushed material is necessary or advisable.

As a result of investigation, it has been established that the most suitable crushing for coal is for it to pass a screen of 1/10-inch aperture.

In ore-dressing, the practice now generally employed is to crush everything smaller than about 1/2 inches in a watery pulp. For coal-crushing we advise that the material be kept dry throughout.

In metallurgical practice, the use of screens is avoided as much as possible, their place being taken by classifiers; for coal treatment we believe that the use of screens is advisable.

These variations from metallurgical practice are rendered advisable simply because coal is a "light" material, whereas metallic minerals are "heavy." Unfortunately, rolls, ball-mills, and the like do not grind to the required degree in the first operation with the guarantee that no oversize will be produced, and control by screen or classifier is necessary. Efficient wet

screening entails the use of large quantities of water, which in turn requires the introduction of dewatering tanks; the only alternative is water classification.

As the shale is of greater specific gravity than coal, control by classifier results in the shale being crushed to a finer degree than the coal. This is economically undesirable: crushing costs money, and shale is the hardest constituent to crush. In this connection it is interesting to note that the work at Skinningrove proved that the ash is largely concentrated in the oversize, as the figures in Table I. demonstrate:—

Table I.—Coal Received from Crusher and Screened on a ⅛-inch Screen.

No.	Ash in total coal Per cent.	Percentage through screen.	Ash in undersize. Per cent.	Ash in oversize. Per cent.
1	18.2	77.8	10.6	44.5
2	13.0	71.4	7.7	26.2
3	13.5	73.7	8.7	37.0

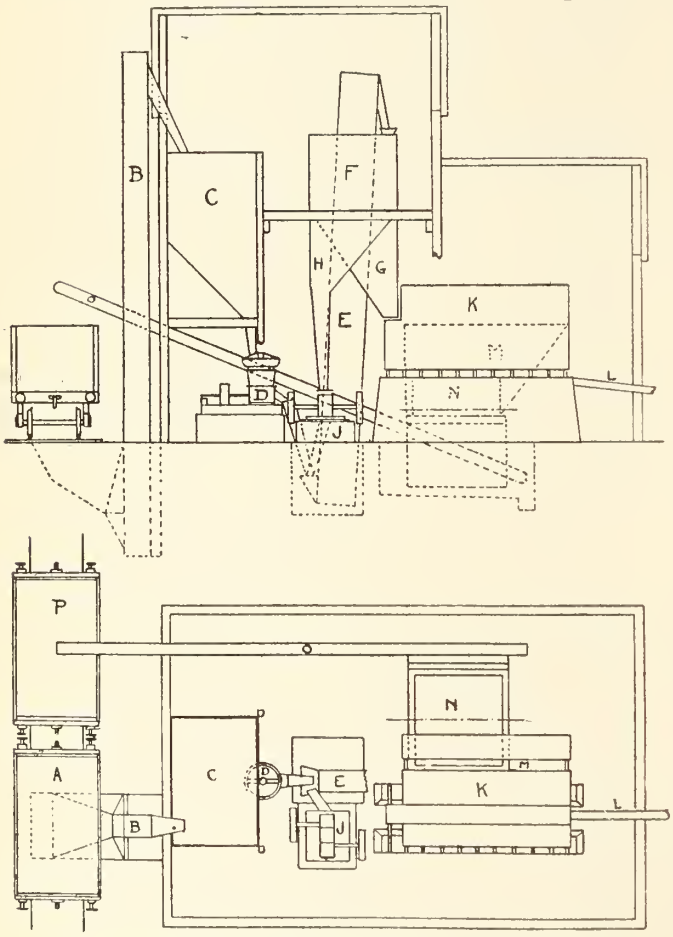


Fig. 1.—Diagram of Testing Plant at the Powell-Duffryn Colliery, Aberdare.

In such a case it may be decided to pass the undersize direct to the ovens without further treatment, leaving only the oversize for the flotation process, although, in view of the still better quality of the flotation product, the wisdom of this course is questionable.

Once the general principles are decided, it is not difficult to suggest a flow-sheet for crushing to flotation size. Our own idea is to crush in gyratory, jaw, or sledge-mills to about ½ inch, screens through vibrating screens of 1/10-inch aperture, pass the oversize through crushing-rolls, and return the product to the screens; the undersize from the screens to pass to the fine storage-bins, and thence to the flotation plant, the washed coal passing to the dryers. Fig. 1 illustrates a testing plant on these lines now operating at the Powell-Duffryn Colliery, Aberdare, whilst Fig. 2 is the flow-sheet relating to the plant.

We believe this method to be both efficient and economical, inasmuch as the material is crushed just fine enough for the purpose, and no finer.

That the product obtained approaches this ideal is indicated by the screen analysis of flotation product made from coal thus treated shown in Table II.

Table II.—Screen Analysis of Coal Concentrates from Oliver Filter, Skinningrove.

Mesh on	Under	Weight percentage Direct	Weight percentage Cumulative	Ash percentage Direct	Ash percentage Cumulative
As produced		100	—	3.5	—
20	10	58.0	58.6	2.7	2.3
40	20	8.3	63.9	3.2	2.76
60	40	5.3	72.2	4.0	2.85
100	60	5.3	77.5	4.5	2.96
150	100	5.3	80.0	4.8	3.03
200	150	2.6	83.4	5.4	3.11
—	200	14.0	97.4	5.9	3.51

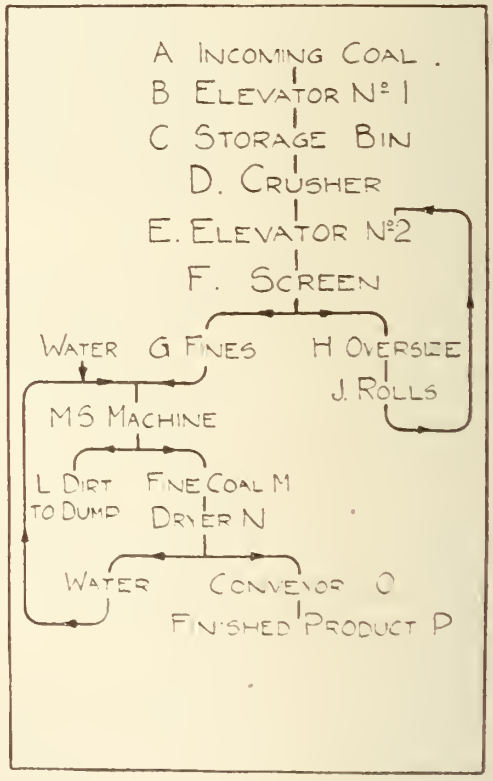


Fig. 2.—Flow-sheet of plant shown in Fig. 1.

(2) **Flotation.**—Concerning the actual operation of the flotation process, nothing is more remarkable than its extreme simplicity in practice, once the proper reagents have been found. Given a steady flow of pulp of suitable water-solid ratio, and a regular feed of reagent, a modern flotation machine will produce a clean product on the one hand and a remarkably value-free residue on the other, in fashion automatic, regular, and persistent. So simple is the process that a large number of different machines have been designed and worked with success in the metallurgical field. Very few, however, are of universal application; and after a close study of their points of advantage and disadvantage, and after practical tests on the subject, we

have come to the conclusion that the type known as the "M.S. Standard" is the one best adapted to the treatment of coal. The machine is usually constructed largely of wood, although other materials, such as sheet-iron or concrete, can be substituted. It is designed to alternately subject the coal-water pulp and reagents to sufficiently violent agitation to entrain air, and then bring it to a state of comparative rest. During agitation the air-bubbles collect and attach themselves to coal-particles, and when the pulp is brought to rest the air-bubbles, heavily charged with their collected load of coal, rise to the surface to form a thick, heavy, stable froth, whilst the remainder of the pulp continues in circuit for retreatment. The machine is a combination of a number of sets consisting of an "agitation-cell" and a "froth-box" placed in series side by side so that the sets have a common wall and the vertical agitators are all in line. Agitation box No. 1 is connected by a slot through the common wall to "froth-box" No. 1, and this is connected by a pipe to "agitation cell" No. 2, the said pipe connecting the bottom of the "froth box" with the centre of the bottom of the "agitation cell." The pulp passes from mixing cell to frothing-box, and from frothing box to the next mixing cell, until all the coal has been removed from the froth. The number of sets required depends upon the character of the coal, four or five being sufficient in most cases. It may be advisable in certain circumstances to add one or two mixing cells, without corresponding froth boxes, at the head of the plant, the flow in that case being from mixing box to mixing box through slots in the common wall.

The accompanying photograph (Fig. 3) shows an 8 mixing cell 8 froth-box plant; whilst Fig. 4 illustrates the flow of the pulp through the machine.

The crushed coal and water in proportions of 4 to 5 parts by weight of water to one part of coal, are fed into the first cell, where is also added the necessary proportion of reagent. This proportion is of the order of half a pound to each ton of dry coal treated, and varies slightly from this according to the particular material. At Skinningrove it has been found that the water used for washing the naphtalene from coke-oven gas is, after the separation by settlement of all the naphtalene still sufficiently rich in suitable reagents to treat all the coal required for the coke ovens; in other words, the production of high grade coke oven coal will cost nothing for reagents.

The coal-water mixture, which we technically term "pulp," then circulates, as previously mentioned, in what may be described as a horizontal spiral curve, discharging washed coal at each forward bend. Such discharges may be taken off individually or combined into one, two, or more qualities, according to requirements. By proper adjustment of the quality and quantity of reagents, the low-ash, high-grade coal is thus early separated from the bone-coal (high fixed ash) and the shale or clay. When this point is reached, as is readily determined in practice, a small quantity of paraffin or similar oil is added to the appropriate mixing cell in the proportion of about one-third pound to each ton of dry original coal. By this addition, the bone-coal, which has hitherto remained with the shale or clay, is induced to float, and is removed as a separate product. Such bone-coals obtained in practice contained from 2 to 15 cent. of ash.

The tailings or residues run to waste from the last froth-box consist of clay, shale, or other gangue material with which the coal was originally contaminated, and have an "ash" content varying from 60 to 85 per cent., according to the nature of the gangue.

(3) **Disposal of Products.**—In the treatment of a coking coal, therefore, three separate products result, namely, the "tailings," the "high-grade coking coal," and the "bone-coal."

(a) **Tailings.**—The tailings in some cases may be of no value, but may in others consist of high-grade fire-clay, in which case recovery might be worth consideration. The proportion of water to solids will be approximately 30 to 1 in the treatment of a coking coal, and the pulp readily flows by gravity to any convenient dumping-ground, where the shale rapidly settles out, leaving the clear water, which is quite innocuous, to pass to the drains.

Where the water is scarce and re-use desirable, the tailings may pass to a continuous-discharge Dorr Thickener, or similar contrivance, which delivers a clear overflow to the pumps, and discharges a thick pulp at the outlet-valve.

(b) **High-grade Coking Coal and Bone-coal.**—Either washed product, which forms as a thick, stable, heavy scum on the water surface in the froth-boxes, is made to overflow gently, as formed, by the aid of revolving paddles, which move it slightly forward at each revolution they make. As discharged from the lip of the froth-box, the product contains about 50 per cent. of moisture. The further draining or drying of this material in the most economical and efficient way is a problem to which we are now paying close attention.

In metalliferous ore-dressing practice, the concen

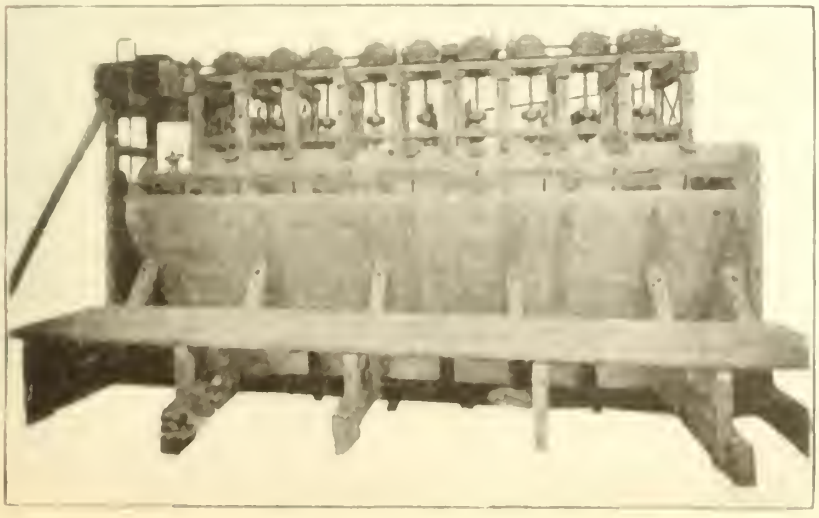


Fig. 3. Photograph of an 8 mixing cell 8 Froth-box Plant.

trate is washed into thickening tanks, discharged into revolving filters of the Oliver type, drained under suction, and discharged as a filter cake containing from 10 to 15 per cent. of moisture. Further drying by heat is part of the smelting process, and does not adversely affect the value of the product.

We have applied this type of treatment with success to coal concentrates, and, by suitable arrangement of the plant, have succeeded in discharging the concentrate directly into the filter, and have thus discarded the thickening process.

Already we have succeeded in reducing the moisture from 50 to 10 per cent., a figure which is comparable with the moisture content in crushed coking coal treated by gravity washers. We consider, however, that this degree of draining from either type of washer is inadequate, average coking practice being deficient in this particular.

An alternative method of mechanical drainage is to employ continuous centrifugal driers, and we are informed that there is such a machine on the market guaranteed to give a product containing 8 and possibly only 7 per cent. of moisture.

It is fully realized in this connexion that there is a limit beyond which the removal of water, as water, is practically impossible, as thin films of water are very persistent. The removal of further moisture beyond this limit necessitates evaporation.

Whether it would be profitable to approach this limit too closely by mechanical means is a question we hope to settle in the near future. In order to supplement these means, or even replace them, we have the possibility of utilizing waste-heat in many ways. Obviously, by proper application, any degree of dryness can be produced, but careful consideration to all proposed methods must be given, because dusting, with its attendant loses and explosion risks, and also overheating, must be avoided. Another disadvantage of such methods lies in the inevitably bulky nature of the apparatus.

Scope of the Flotation Process in Coal-washing.—So far we have discussed the question of coal flotation chiefly from the point of view of its application to the production of blast-furnace coke. The same process, however, with little or no modification, is equally applicable to the treatment of (1) low-grade coals for fuel purposes, (2) washery waste, (3) dump waste, (4) stock duff, and (5) slurry or other coal-bearing material.

The application of the process to the treatment of such materials is now well established, the results shown in Table III. having been obtained from waste material (Powell-Duffryn Aberaman tip):—

Table III.—Results obtained from Waste Material.

	Product.	Weight. Percentage.	Ash. Percentage.	B.Th.units per pound.
(1)	Raw coal	100	70.4	2,280
	Washed product. .	15	15.6	12,450
(2)	Raw coal	100	67.6	5,230
	Washed product. .	21	10.5	12,280
(3)	Raw coal	100	48.5	4,390
	Washed product. .	30	10.5	12,680

The chief difference between treatment of high-grade coal and low-grade waste lies in the different proportions of product to waste — a factor which is readily allowed for in designing the plant. In our experiments we have succeeded in obtaining perfect separation of coal from shales and other impurities, in whatever proportions the minerals may be mixed, and we have met with equal success in the treatment of all types of material as above-mentioned. These include the finest coal-dust found on colliery roads, at pit-heads, and in the slurry ponds to which the fine untreatable discard of gravity washers is led.

Arguing from general principles, it might be maintained that the presence of pyrites in a coal would bar its treatment by flotation, since pyrites is one of the metallic minerals readily concentrated by the process. As a matter of fact, however, the reagents employed to treat coal are of a different character from those

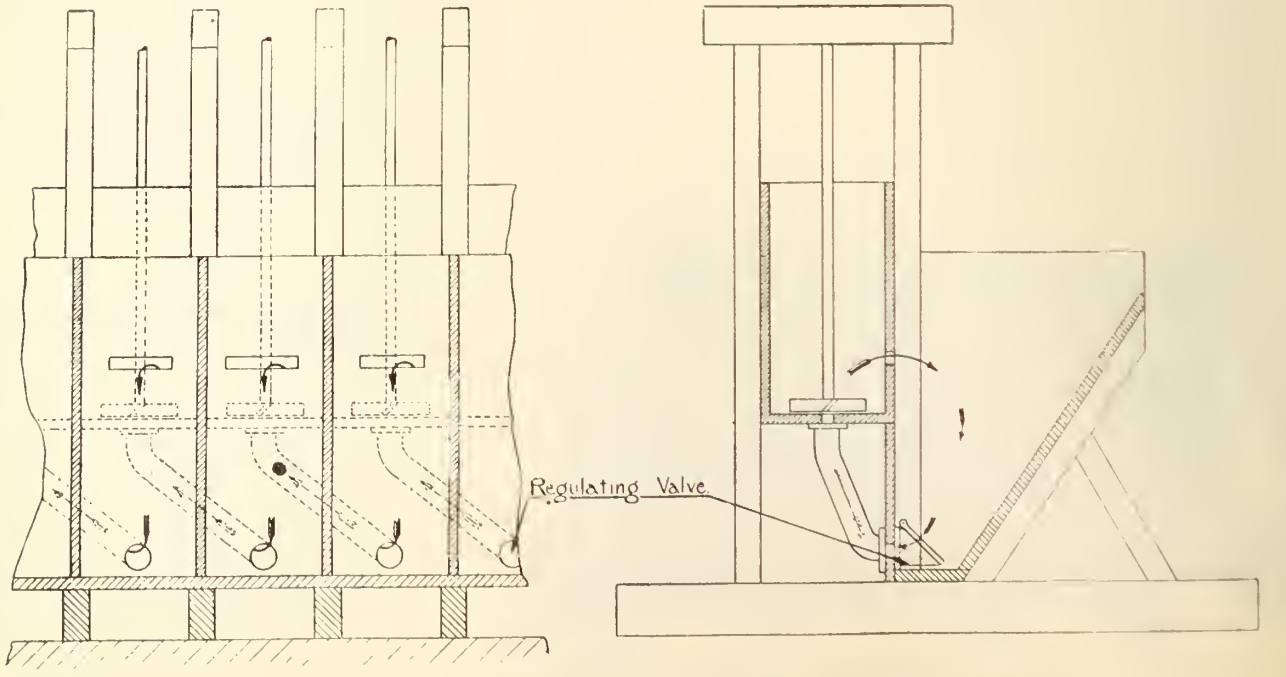


Fig. 4.—Diagram illustrating the Flow of the Pulp through the machine.

necessary for pyrites, and it is found that in the treatment of pyritic coal the coal floats for preference, with the result that the product obtained contains less sulphur in proportion than the raw material. Gypsum and other sulphates are, practically speaking, totally eliminated by the process.

Table IV.—Results of Tests.

Original		First product		Second product		Third product		First and second products together		Tailings	
No	Ash	Weight	Ash	Weight	Ash	Weight	Ash	Weight	Ash	Weight	Ash
	Per cent	Per cent	Per cent	Per cent	Per cent	Per cent	Per cent	Per cent	Per cent	Per cent	Per cent
					CRUDE COALS.						
					A—Coking.						
1	12·4	78·6	3·1	9·2	10·1	—	—	87·8	3·8	12·2	72·4
2	24·2	62·7	3·4	13·2	14·5	—	—	75·9	5·2	24·1	78·5
3	15·8	81·1	3·0	2·1	19·3	—	—	83·2	5·4	16·8	76·0
					B—Industrial (non-coking).						
4	25·5	73·8	8·9	—	—	—	—	—	—	26·2	84·5
5	27·0	68·3	9·0	—	—	—	—	—	—	31·6	76·0
6	21·8	41·0	6·0	28·6	9·1	—	—	69·8	7·3	30·1	74·4
7	28·2	34·2	7·8	32·5	11·2	5·8	20·7	66·7	9·4	27·5	78·8
					SLACKS.						
8	30·0	63·6	11·4	5·3	21·7	—	—	68·9	12·2	31·1	80·0
9	30·5	71·0	9·6	—	—	—	—	—	—	29·0	86·5
					SILTS.						
10	35·5	60·2	8·1	—	—	—	—	—	—	39·8	74·0
11	33·8	48·5	11·7	—	—	—	—	—	—	51·5	78·0
12	21·5	83·8	9·9	—	—	—	—	—	—	16·2	81·5
13	45·2	59·0	12·5	—	—	—	—	—	—	40·5	82·8
					DUMPS AND WASHERY WASTE.						
14	74·0	16·8	13·0	—	—	—	—	16·8	13·0	83·2	86·6
15	49·3	53·0	7·9	—	—	—	—	53·0	7·9	47·0	75·8
16	61·2	30·2	10·1	—	—	—	—	30·2	10·1	67·8	86·1
17	76·0	14·5	13·5	—	—	—	—	—	—	83·0	87·6
18	62·2	10·8	7·2	13·5	11·6	5·0	25·8	24·3	9·6	70·7	84·8
19	62·0	13·3	6·7	9·5	12·8	6·2	34·6	22·8	9·25	71·6	82·7
20	75·0	11·5	8·2	3·2	21·0	1·5	13·0	16·2	14·0	83·8	88·5
21	63·8	24·6	8·3	4·1	26·1	—	—	28·7	10·8	71·3	86·5

If we were asked to state the most striking fact in the application of this process to coal-washing, we would refer without hesitation, to the facility with which it separates one grade of coal from another merely by the simple control of reagents, and without the aid of any form of screening or classification. This property renders the process so elastic in regulation that it requires only elementary skill and a little intelligence on the part of the operator in charge to produce the most profitable separation into (1) fine, high-grade, low-ash coal; (2) band, bone, or bastard coal of dull appearance, and high combined ash; and (3) shales, clays, gypsum, etc., compatible with the type of coal treated, and the purposes for which the products are intended.

The separation of the bone, band, or bastard coal, as shown above, is new in the annals of colliery practice, since this cannot be removed by gravity treatment, its separation in this case being entirely a matter of surface tension. The ash-content in band-coal may be said to be almost entirely molecularly mixed with the carbonaceous substances, and no degree of crushing and washing would effect its purification. The fact of its removal by froth flotation means that the true coal is thus available for the manufacture of fuels of a new standard, and indicates a probable revolution in blast-furnace practice. We have succeeded in making coke from this concentrate containing 4·8 to 5·0 per cent. of ash, whose physical strength was beyond anything in our experience.

Results.—In the course of our investigations we have made a very large number of tests, the majority of which were made with objects outside the scope of the present paper. To enumerate these results would be tedious, and we content ourselves by giving in tabular form (Table IV.) a selection which illustrates the points we have discussed.

Economic Aspects of the Process.—From a technical point of view we were convinced, by our experience, that the new process was a distinct success, and a careful enquiry into the economic aspect of the question assured us that flotation, applied to coal-washing, could in no way be compared to the use of a Dreadnought as a ferry-boat; quite to the contrary, examination shows that its introduction will bring a comfortable margin of profit in the one case we have investigated, namely, the production of clean coal for making blast-furnace coke.

It may be argued that the rejection of the band-coal could not be economically supported by the colliery industry, and, indeed, we cannot afford to reject anything in the trade which is combustible. We hold, however, that in the preparation of metallurgical coke this band-coal should be isolated and applied for purposes of combustion where its high ash-content cannot materially interfere with the economy of such processes. We suggest that this material should be better employed, say, for combustion purposes in raising steam and the manufacture of producer-gas, rather than be charged into the blast-furnace to make slag, with its concommitant extravagance. Accepting as an axiom that nothing should be charged into the blast-furnace but materials which would make for the most economic manufacture of pig-iron, our investigations into froth flotation have brought us to the decision that only coke made from true coal should be utilized for the manufacture of pig-iron.

Some of the most obvious advantages accruing from the flotation of coal for the production of blast-furnace coke for the smelting of iron and steel may be categorically summarized as follows:—

(1) **Ash Reduction.**—Saving in cost of handling, particularly where the place of the production of the material to be coked is situated at some distance from the coke-ovens.

(2) **Economy in Coking.**—The product is more highly bituminous, yields a richer gas and a larger quantity of bye product, whilst the ash reduction admits of a larger efficient charge to the coke ovens.

(3) **Production of Superior Coke.**—The coke produced is, for blast-furnace purposes, superior to any other. It is harder and denser, yet highly porous; it contains a minimum of ash, sometimes under 4 per cent.; it resists the crushing effect in the blast furnace, and offers all those advantages which only such a coke could offer.

(4) **Economy in Furnace Space.**—There is more room for an increased quantity of iron ores and fluxes.

(5) **Minimum of Silica owing to Ash Reduction.**—Less coke consumption required and less limestone flux per ton of ore.

(6) **Economy of Thermal Efficiency of Blast-furnace.**—The production of slag is reduced. Fewer thermal units are therefore employed in its formation, and fewer taken from the furnace by the molten slag.

(7) **Density of Coke means less Fines.**—The very dense coke means a greater quantity of large coke and the screening out of a lesser quantity of fines. The **total value** of the product of the oven is thus raised.

(8) **Maximum Thermal Efficiency at Critical Zone of Furnace.**—The resistance of the hard coke to the crushing effect of the furnace burden minimizes the tendency towards coke consumption in the upper cone of the furnace, and the maximum number of heat units

is developed at the tuyere lines, or, in other words, at the point of highest thermal effectiveness.

From long experience with a given plant, we are prepared to resolve the foregoing economics into a reduction in cost of manufacture, working upon ordinary Cleveland ironstone, as between gravity washing and flotation washing as follows:—

For the Production of 1 Ton of Pig-iron.

	Cwts.
Burden of coke with 10 per cent. of ash from modern washery product coal	23
Burden of coke with 5.5 per cent. of ash from flotation product coal	21
Economy in coke	2

	Cwts.
Economy in limestone	1.5

Saving per ton of Pig-iron produced.

	s.	d.
2 cwt. coke at 62s. 9d. per ton	6	3.3
1.5 cwt. limestone at 9s. 6d. per ton	1	2.4
Saving in coke and flux alone	7	5.7

This is equivalent to—

	s.	d.
Saving per ton of coking coal	5	8.40
Allowing for ash discarded at 41s. per ton	1	10.73
	3	9.67
Less royalty	0	6.00
Net gain per ton of iron	3	3.67

In our calculations we assumed that the bone-coal, which is of similar ash value to the raw material, will be utilized at its purchase value for processes outside the manufacture of pig-iron coke.

As the cost of flotation is practically the same as that of jig-washing, it is clear that the economics of the process are perfectly sound.

The extraordinary flexibility of the flotation method of washing coal, which permits of the treatment of all grades of fuel down to the smallest dust, will, in our opinion, become an asset of national importance. There is no pit-heap containing coal, or washery heap, or fine dust, or other colliery waste, from which the coal cannot be completely recovered by this method of treatment. It may prove that valuable business can be established in the purchase of waste-heaps, which colliery firms have hitherto neglected. The adoption of this process will render available for use in the iron and steel industries, and other consumers of coal, large quantities of fuel which have hitherto been regarded as valueless, or even, in some cases, been thrown to waste.

The flotation method does not, of course, compete with washers treating nut-coal for sale on the open market for boiler-firing, etc.; it can be employed only where the original coal is fine or where crushing is part of the normal treatment—that is, for coking, gas-making, briquetting, coal-dust firing, colloidal fuel, etc.

We desire to record the very able services of Mr. F. Butler-Jones, Mr. A. Bicknell, and Mr. Arnold Bury, whose experimental work has been indefatigable in this research.

Northern Ontario Letter

THE SILVER MINES.

The Cobalt District.

A rich silver strike has been made at a depth of 360 feet on the Keeley Silver Mines in South Lorrain. Lateral work has been under way for some time at that level where a large tonnage of good milling-rock has been blocked out. It has been officially estimated that over half a million ounces of silver are in sight as a result of former work in ore containing an average of upwards of 25 ounces to the ton. Further lateral work has been proceeding along the main vein at a depth of 360 feet during the past two or three weeks and has resulted in the discovery of high-grade ore which is stated to be very similar to the rich ore taken from the adjoining Wettlaufer mine some years ago, which property produced upwards of two million ounces of silver from a small area. It is too early to estimate the extent of the find on the Keeley until further work is done but, occurring as it does at a point not far from the lower contact, it is regarded as being important.

Another favorable factor in connection with the silver mining industry of this district is that the Mining Corporation of Canada will probably re-open its mines in Cobalt within the next few days. The Company, prior to closing down during the first week in March, was the second largest silver-producer in Canada. In the meantime, the work of increasing the capacity of the plant about 50 per cent over its former rate has been carried on and this work is just receiving the finishing touches. Also, a small force of men has been engaged on the company's Buffalo Mine which it purchased a year or so ago, and all is now in readiness to draw a large volume of ore from this property. The Mining Corporation employes about 250 men when working at full capacity.

Work has been commenced on the Victory Silver Mines, situated in the vicinity of the Temiskaming and Beaver mines in the south-eastern part of the township of Coleman. The operators are optimistic over the appearance of the property as shown during the course of getting the work started. In the early days of the camp, attention was directed largely to the high-grade ore shoots and many valuable veins appear to have received too little attention. It is believed Victory Silver Mines may be numbered among these in that the geological structure is quite favorable, and with veins showing native silver at surface.

Current reports would indicate that there are fair possibilities of the old Silver Cliff mine being re-opened within a reasonably short time. Tentative negotiations with this object in view have been under way for some little time.

It is also reported that work may be resumed this summer on the property of the Casey Mountain Syndicate, situated in the township of Casey in the vicinity of the Casey-Cobalt mine. Some of the interested parties appear to have formed themselves into a body known as the Casey Mountain Co-operative Syndicate for the purpose of providing funds with which to carry on the desired exploration and development work.

In a general way, activity is increasing in the silver-mining areas of Northern Ontario. This includes Cobalt, Gowganda, Elk Lake, Casey township and South Lorrain. The increase seems to be due in part to an improved economic condition, as well as to the belief that with the world now producing silver at a rate lower than any previous year since 1890, there is

small likelihood of the price declining to any great extent below the present quotations. Indeed, now that the great volume of silver released during the recent war seems to have settled down into grooves of general demand, the belief is taking form that prices may reasonably work to higher levels.

In the regular monthly statement issued to the president and directors of the Nipissing Mining Company, Hugh Park, manager, states that during the month of April the company mined ore of an estimated net value of $142,610 (including $14,424 of Cobalt) and shipped bullion from Nipissing and custom ores of an estimated net value of $177,762. The value of the silver production was estimated at 61 3-8 cents an ounce. "Underground work was suspended for part of the month on the town side of the Lake, due to the destruction of 73 shafthouse by a fire on April 11th. Operations at the low-grade mill were not interfered with to much extent, the tonnage being obtained from the township side of the lake. Temporary hoisting arrangements at 73 shaft were completed on April 22nd and underground work and production is going ahead as usual. A permanent headframe is now being erected. "There were no unusual developments underground during the month. The low-grade mill treated 6,633 tons. The high-grade plant treated 91 tons. The refinery shipped 301,075 ounces of bullion.

J. P. Bickell, president of the Temiskaming Mining Company states that the property will not be re-opened under present conditions. A lower cost of operation or a higher price for silver will be necessary before an attempt is made to place the mine on a producing basis. This statement was made in response to unofficial rumors that the property might be opened at an early date.

ORE STATEMENT.

Following is a statement of ore shipments over the T. & N. O. Ry. for the month ended April 30th:

(In tons of 2,000 lbs.)

SILVER ORE.

Cobalt Proper—	Tons.
1 Coniagas	65·64
2 LaRose	62·94
3 O'Brien	64·00
	192·58

The above shipments were made to the following Companies:

Canada—	
Deloro Smelting & Refining Co., Deloro	64·00
Coniagas Reduction Co., Thorold	95·59
United States—	
American Smelting & Refining Co., Perth Amboy	32·99
	192·58

Price of Silver.

	Cents per Oz.
April 12th—Highest	62·875
April 1st—Lowest	56·125
Average	59·337

During the week ended May 13th, ore shipments from the mines of Cobalt were heavier than for some time, the Coniagas and the O'Brien sending out a total of four cars containing approximately 291,366 pounds. Following is a summary:

Shipper.	Cars.	Pounds.
Coniagas	2	162,396
O'Brien	2	128,970
Totals	4	291,366

During the corresponding period, the Nipissing mine shipped 30 bars containing 51,082 ounces.

THE GOLD MINES

The Porcupine District.

Large additions to the mill on the McIntyre-Porcupine Mines promise to mark the last half of the current year. The company is working its present equipment at full capacity of not far under 600 tons of ore daily, and is producing gold at the rate of from $175,000 to $185,000 every thirty days. In spite of this, the ore reserves are such and the result of development work at depth so favorable that a further big addition to the plant appears to be warranted at once. Accordingly, the grinding equipment is stated to have been placed on order with a view to having the additional milling facilities in operation by about December 1st, at which time it will be possible to treat 900 tons of ore daily and produce $250,000 monthly.

In an interview with A. F. Brigham, general manager of the Hollinger Consolidated, the Journal correspondent was informed that some of the recent reports about the capacity of the plant had been over optimistic in that the rate would not exceed an average of about 3,300 tons of ore daily, as compared with an intimated unofficial estimate of 3,500 tons daily. Mr. Brigham also left the impression that the unofficial estimate of a monthly yield of a million dollars was over-optimistic. As to this, were the plant to average 3,300 tons daily, and recover $10 per ton which is below the average as estimated in the ore reserves, the daily yield would amount to $33,000 or at the rate of a little over a million a month. From this, therefore, it may be gathered that mill heads may be slightly reduced now that the plant has been brought up to the full capacity. With recovery of $9 a ton on the basis of full operations, the annual yield would approximate $10,810,500, not including the premium received as a result of the exchange rate as existing between Canada and the United States. Concerning the question of when the Hollinger would take up the matter of developing the Kettle Falls water power, Mr. Brigham merely remarked that something must be done to assure the mines of ample hydro electric power as a precaution against the possible recurrence of such a costly shortage as that which occurred during the closing weeks of 1920 and the first four months of the current year. There has been some publicity given to the fact that the Hollinger is to make a close bid for the world record in point of annual production. This publicity has brought some criticism. As to this, neither the publicity nor the criticism has come from officials of the company, but the facts of the case are these. The company has no selfish motive to set out for a world record but the truth is that the resources of the property are such that in the natural course of their conservative development they offer promise of ultimately surpassing in point of annual yield any other gold mine in the world. In fact there are so many known but as yet undeveloped ore bodies and such great resources in the veins already developed that within a reasonably short time as gold mining goes this enterprise could conservatively win the distinction of world leadership

—all the criticism and meaningless uncalled-for questions of "Why?" notwithstanding. "Why a 'world' record?" asks one writer. To which it may be replied: A world record for the reason that it may be impossible to avoid such an achievement during the natural course of operating this gold property upon a scale which its resources warrant.

The outlook for the Porcupine V.N.T. Mines, in regard to the likelihood of this property being re-opened on a large scale, is becoming more favorable and there are now excellent prospects of the necessary arrangements being made within a reasonably short time.

At a meeting of the shareholders of the Moneta-Porcupine Mines, it was stated that arrangements are being made to finance a scheme of exploration work. A block of treasury stock is to be sold and additional funds to be loaned to the company for this purpose. The property lies immediately to the west of the Hollinger Consolidated.

The Kirkland Lake District.

Developments on the Lake Shore mine during the past two or three weeks have been exceedingly favorable, both No. 1 and No. 2 veins being found to contain high-grade ore at the 600-ft. level. The opening up of these bodies at that depth, and the driving of a raise through to the 400-ft. level promises to make it possible for the company to estimate large ore-reserves by the close of its fiscal year at the end of November, next. Heretofore, owing to development work not being sufficiently advanced, the management has refrained from any definite estimate of reserves. In one stope at the 400-ft. level there is between 18,000 and 19,000 tons of ore actually broken and ready to draw out for the hoisting to the mill. This ore is high-grade, averaging upwards of $28 to the ton.

The Wright-Hargraves mill is giving excellent satisfaction and is treating all the ore as it comes from the lateral work at the levels where drifts are being extended for the purpose of opening stopes.

By the late Summer, the mill on the Kirkland Lake Gold Mines will attain full capacity operations at an average rate of between 150 and 160 tons of ore daily. This rate is occasionally reached at the present time, although the average is slightly below that figure. The ore shoots at and below the 700-ft. level are found to be extending in length as compared with the upper levels of the mine.

Good headway is being made on the Kitchener-Kirkland property, situated in the northwestern part of the township of Teck, and adjoining the La Belle-Kirkland and the Fidelity. A shaft is being sunk on a vein some ten feet in width in which an encouraging gold content occurs.

At a meeting of the shareholders of the Elstone-Duncan Gold Mines, holders of property in the township of Ganthier, it was decided to remove the head-office from New Liskeard to Toronto. Arrangements are being made to carry on quite an extensive program of exploration and development work on this promising gold prospect.

The Boston Creek District.

A spectacular gold discovery has been made on the Walsh claims in lot 5, concession 3, in the township of Catherine. The find was made by Hugh Walsh, a well-known prospector. Two large veins have been opened up, the pay-streak in one being 15 inches in width.

TORONTO MINING STOCK QUOTATIONS.

Prices of Active Stocks on Standard Stock Exchange for Week Ending 14th May 1921.

	High	Low	Last
SILVER			
Aladdin Cobalt	1¼	1⅛	1¾
Adanac Silver Mines, Ltd.	1¼	1⅛	1½
Beaver Consolidated	34	32	34
Coniagas	1.76	1.76	1.76
Crown Reserve	13	13	13
Gifford	1⅛	1	1⅛
Great Northern	1¾	1¾	1¾
McKin.-Dar.-Savage	19	19	19
Mining Corp. of Can.	1.14	.90	1.14
Nipissing	5.25	5.05	5.25
Ophir	1⅜	1⅜	1⅜
Peoples Silver Mines	1⅞	1⅞	1⅞
Temiskaming	193¼	171½	19
Trethewey	20	153¼	17
GOLD			
Apex	1½	1½	1½
Atlas	19	18	18½
Boston Creek Mines	9	9	9
Dome Extension	75½	75	75
Dome Lake	4⅛	3¾	4⅛
Dome Mines	22.90	20.50	22.50
Gold Reef	3¾	3¼	3¼
Hollinger Cons.	7.26	7.20	7.25
Hunton Kirkland G. M.	9½	9½	9½
Inspiration	3	1½	3
Keora	14	12	13
Kirkland Lake	51	48	50
Lake Shore Mine Ltd.	1.34	1.30	1.32
McIntyre	2.05	1.97	1.99
Moneta	13	12	12
Newray Mines, Ltd.	8	7¼	8
Porcupine Crown	28	27½	27½
South Keora	34	32½	34
Porcupine V. N. T.	20	18½	19¾
Preston East Dome	3⅝	3⅝	3⅝
Schumacher	24	22¾	24
Teck-Hughes	18	16¼	16¾
Thompson Krist	8	7¾	7¾
West Dome	10	7¾	8½
West Tree Mines, Ltd.	3½	3	3½
Wakenda	3½	3½	3½

TORONTO METAL QUOTATIONS.

	May 16th.	April 5th.
Copper, Electro	17½	17¼
Copper, Casting	17¼	17
Tin	40	34
Lead	6¾	6½
Zinc	7½	7½
Aluminium	30	34
Antimony	8	7½

MONTREAL METAL QUOTATIONS.

Following the fair average prices for ingot metals (in less than car-loads) at Montreal:

	May 12	May 18
Copper, Electro	17½	17½
Copper, Casting	17¼	17¼
Tin	39	40
Lead	7	7
Zinc	8	8
Aluminium	33	33
Antimony	7½	7½

British Columbia Notes

BRITISH COLUMBIA LETTER.

Stewart, B.C.

The Red Cliff Group of Mineral Claims situated on Bear River is reported to have been taken over by Messrs R. W. Wood and A. B. Trites, who proposes doing development work this year. The outcrop on the Montrose Claim is said to contain good gold values with a small percentage of copper and a greater one of iron pyrites.

P. H. Graham, who has charge of the installation of an eleven-mile aerial tramway for the Premier Mining Co. which will transport ore and concentrates from that company's property, Salmon River, to tidewater near Stewart, has taken over personal direction of the work. The tramway, the route of which parallels the wagon road and is approximately 11½ miles in length, the second longest of its kind on the American continent, will require enough lumber to keep the Hyder and Stewart Mills busy for some months. There are to be 150 ordinary towers and twelve tension towers as well as three angle stations and two terminals. The stationary or carrying cable will be one-inch steel and the travelling cable five-eighths of an inch in diameter. Mr. Graham also is to supervise the construction of ore bunkers at the wharf at Stewart with proposed capacity of 4,000 tons.

Hudson's Hope, B.C.

The Provincial Government has let a contract to Lynch Brothers, of Vancouver, B.C., to sink three test holes by diamond drill, there to be a minimum of about 3,000 feet of drilling done, in the Boulder Creek District, about 24 miles northeast of Hudson's Hope. The party already has set out for the locality and expects to commence work very soon. This action is in line with the policy of the government of definitely ascertaining the oil possibilities of the Peace River Country. Mining engineers have been in this territory for two years on behalf of the Provincial Administration and their reports have been of such a character that the time now has arrived for practical prospecting. The drilling of this season, it is hoped, will demonstrate the presence of oil and possibly prove that it is in paying quantities.

The placer gravels of the Ingenika River, Peace River District, are to be prospected this year on a considerable scale for gold and platinum if the plans of R. D. Fetherstonehaugh, mining engineer, and his associates are carried through successfully. Mr. Fetherstonehaugh has done much preparatory work. His sampling of the locations that have been acquired is said to have given returns extremely satisfactory both in respect of gold and of platinum. He will be assisted in his enterprise by William Hubbrough, mining engineer of San Francisco, Cal. The company's claims are on the Peace and on an old river bed not far from Hudson's Hope. They will be worked by the draw line scraper system, the capacity of the scraper being 1,000 yards of gravel daily. There will be two engines of 30 horse power, two boilers and a ten-inch centrifugal pump, in addition to other plant adjuncts. Generally the method to be adopted is the same as that lately used in California and other fields. Mr. Fetherstonehaugh estimates that the gravel can be handled at the rate of 10 cents a yard and that the gold and

platinum contents will run from $1 to $1.50 for the same quantity. Operations will continue until about the middle of October. Officials and workmen will be housed in tents, there being no intention at present to construct a permanent camp. Supplies will be obtained at Hudson's Hope.

Nelson, B.C.

At the annual meeting of the Standard Silver-Lead Mining Company the following were re-elected directors for the ensuing year: W. J. Wakefield and George H. Aylard, of Victoria, B.C.; L. K. Larsen, of Nelson, B.C.; William A. Carry and Charles Hussy. Mr. Wakefield is the president, Mr. Aylard, vice-president; and Mr. Hussy, secretary-treasurer. Mr. Hussy announces that the same policy will be followed, viz., the payment of no dividend and continuance of the search for available mining property in which to invest. Receipts for the year ending December 31, 1920, are given as $216,609 with disbursements of $143,197, giving an operating gain of $73,412. The net gain for 1920 is $69,162 while the balance on December 31, 1920, was $367,173. Cash in banks and government bonds are given as $316,104 and $56,800 is invested in term mortgages.

The Silversmith Mines, Ltd. has effected a deal with the Minnesota Silver Company and F. W. De Foe, et el, of New York, by which the management of the Silversmith secures the use of the Ivanhoe mill site, mill, and water power at Sandon. In order to utilize the mill it is necessary to construct a 4,000-foot tramway from the lower workings of the Silversmith Mine to the mill. The latter also will be thoroughly overhauled and remodeled to meet the requirements of the new users. It is estimated that, with the completion of this work, the plant will be capable of treating 150 tons of ore in a 24-hour day. The Silversmith now will be able to mill its ore the year round. The old mill, owing to water shortage, has been able to operate only seven or eight months in each year.

An action has been brought against Clarence Cunningham—the well-known Kootenay mining operator, by Robert Insinger, of Spokane, Wn., manager of the Northwestern and Pacific Hypotheek Bank, acting also for associates in the ownership of the Hewitt Mine. It is sought by the plaintiffs to recover $37,500 claimed to be due as payment on the Hewitt Mine operated by Mr. Cunningham on an option to purchase. Much evidence has been heard and a great deal of legal argument. The judgment has been reserved.

Trail, B.C.

Ore receipts in gross tons at the smelter of the Canadian Consolidated Mining and Smelting Co. from April 21st to the 30th totalled 12,056 tons. Of this the company mines contributed 12,023 tons and the Sally, Beaverdell, 33 tons. This brings to total for the year up to 139,816 tons.

Vancouver, B.C.

A Vancouver branch of the Yukon Order of Pioneers has been formed. Membership is limited to those who entered the Northland prior to 1909. At the first banquet of the organization there were present many who had "mushed" over the historic Chilcoot and White Pass trails to the goldfields. The company included three ex-governor of the territory, Mr. F. T. Congdon, K.C., Mr. Alex. Henderson, K.C., and Capt. George Black; two ex-mayors of Dawson City, Messrs. Henry C. McAulay, the first to hold that office in the centre of the Yukon, and R. P. McLennan; and other former northerners of distinction. One of the outstanding oratorical incidents of the affair was the declaration by Edward C. Russell, Seattle, Wn., grand president of the Y. O. O. P., that greater things than have been are to come out of the Yukon in the way of commercial development when "the solid-silver ores of the Mayo and other sections are exploited."

William Elliott, a well-known Canadian returned soldier and a prospector, writes from the Mayo District that the Guggenheims are opening up new rich claims and are striking good ruby-silver. He says that the Northwest corporation, a subsidiary company of the South American Consolidated Gold Fields, has secured fifty claims. The opportunities for obtaining ground with small capital will be limited after next Summer. The Canadian Pacific Ry. Co. is looking up property on the Christable Creek slope of Keno Hill and others are investigating the Rambler, Lookout, Stand To, Patterson and Cameron Mountains. Prospectors are pushing towards the north and south forks of the McQuestion river. Martin Ravey, of Vancouver, describes the first prospecting that was done where now is Camp Mayo. In '98 he packed in the first miners equipment to test the silver of Mayo. "At that time" he says "any man looking for quartz in that country was looked upon as one proposing to live 1,000 years, that is if he thought of profiting. I made my last trip with an old husky dog, fully 90 per cent wolf. I could pack 60 pounds on that old fellow and took in a drill, hammer, dynamite caps, pick and shovel. After firing my first shot I sat..... picking up beautiful blocks of galena wondering at the wealth that fellow prospectors had said would never be developed..... According to a government report issued in 1918, Louis Bauvette "discovered" silver in July of that year. I might state that it is probable that the blazes of trails, the remains of camp, and the very discovery-holes of the first silver strike were grown over with moss when Beauvette staked Keno Hill."

SUDBURY DISTRICT NOTES.

D. E. CUSHING.

Schreiber District.

The Schreiber Mining District bids fair to add another chapter to the mining history of Canada. Gold discoveries, with subsequent high assays are attracting the prospectors from various other mining camps. Forerunners of the trek have reached the district. They are of the type who made the Yukon, Porcupine and Cobalt possible.

Prominent among the first arrivals were R. E. Wilson and Hugh McEachren. Both are old timers in the mining game. Mr. Wilson was in the Yukon rush of 1898 and has mined in Siberia, Cobalt and Porcupine. McEachern also numbered among the first in the different camps. Both are impressed so far with what they have seen in the Schreiber area.

Mr. McLaughlin, another arrival, has not only been a pioneer in the many different camps but has also been in the various Australian and South African camps.

Many claims have been staked in the Schreiber area. Perhaps the best are in the vicinity of Duke Lake, and the surface showings there are reported to be of high promise. One prospector, named Longworth, recently sent a number of samples to New York interests and they report that the assays show consider

The Canadian Miners' Buying Directory.

Acetylene Gas:
Canada Carbide Company, Ltd.
Prest-O-Lite Co. of Canada, Ltd.

Acetylene Welding:
The Toronto Iron Works, Ltd.

A.C. Units:
MacGovern & Co
Powley & Townsley, Limited.

Agitators:
The Dorr Co.

Air Hoists:
Canadian Ingersoll-Rand Co., Ltd
Mussens, Limited.

Air Receivers:
The Toronto Iron Works, Ltd.

Alloy and Carbon Tool Steel:
International High Speed Steel Co., Rockaway, N
Peacock Brothers Limited.

Alternators:
MacGovern & Co.

Spielman Agencies, Itegd.

Aluminium:

Amalgamators:
Northern Canada Supply Co.
Mine and Smelter Supply Co
Wabi Iron Works.

Antimony:
Canada Metal Co.

Antimonial Lead:
Pennsylvania Smelting Co

Arrester, Locomotive Spark:
Hendrick Manufacturing Co.

Assayers' and Chemists' Supplies:
Dominion Engineering & Inspection Co
Lymans, Limited
Mine & Smelter Supply Co.
Pennsylvania Smelting Co.
Stanley, W. F. & Co., Ltd

Ash Conveyors:
Canadian Link-Belt Company

Ashes Handling Machinery:
Canadian Mead-Morrison Co., Limited
Canadian Link-Belt Co., Ltd

Assayers and Chemists:
Milton L. Hersey Co., Ltd
Campbell & Deyell
Ledoux & Co.
Thos Heys & Son
C. L. Constant Co.

Asbestos:
Everitt & Co

Balls:
Canadian Foundries and Forgings, Ltd
Hull Iron & Steel Foundries, Ltd.
Peacock Brothers Limited.
The Wabi Iron Works.
The Hardinge Conical Mill Co

Ball Mills:
Hardinge Conical Mill Co
Hull Iron & Steel Foundries, Ltd
Mine and Smelter Supply Co.
The Wabi Iron Works

Balances—Heusser:
Mine and Smelter Supply Co

Babbit Metals:
Canada Metal Co.
Hoyt Metal Co

Ball Mill Feeders:
Hardinge Conical Mill Co
Hull Iron & Steel Foundries, Ltd

Ball Mill Linings:
Hardinge Conical Mill Co
Peacock Brothers, Limited
Hull Iron & Steel Foundries, Ltd

Belting—Leather, Rubber and Cotton:
Canadian Link-Belt Co., Ltd
The Mine & Smelter Supply Co
Northern Canada Supply Co
Jones & Glasco

Belting:
R. T. Gilman & Co
Gutta Percha & Rubber, Ltd

Belting—Silent Chain:
Canadian Link-Belt Co., Ltd
Hans Renold of Canada, Limited, Montreal, Que
Jones & Glasco (Itegd.)

Belting (Transmission):
Goodyear Tire & Rubber Co

Belting (Elevator):
Goodyear Tire & Rubber Co

Belting (Conveyor):
Goodyear Tire & Rubber Co
Gutta Percha & Rubber, Ltd

Bins and Hoppers:
The Toronto Iron Works, Ltd.

Blasting Batteries and Supplies:
Canadian Ingersoll-Rand Co., Ltd
Mussens, Ltd.
Northern Canada Supply Co.
Canadian Explosives, Ltd.
Giant Powder Co. of Canada, Ltd
Powley & Townsley, Limited.

Bluestone:
The Consolidated Mining & Smelting Co
The Conlagas Reduction Co., Ltd.

Blowers:
Canadian Fairbanks-Morse Co., Ltd
MacGovern & Co., Inc.
Northern Canada Supply Co.
Fraser & Chalmers of Canada, Ltd.

Boilers:
Northern Canada Supply Co.
Canadian Ingersoll-Rand Co., Ltd
Marsh Engineering Works
MacGovern & Co., Inc.
R. T. Gilman & Co.
Fraser & Chalmers of Canada, Ltd
The John Inglis Company
Wabi Iron Works.

Blue Vitriol (Conlagas Red):
Canadian Fairbanks-Morse Co., Ltd

Bortz and Carbons:
Diamond Drill Carbon Co.

Boxes, Cable Junction:
Standard Underground Cable Co. of Canada, Ltd
Northern Electric Co., Ltd.

Brazilian Rough Diamonds:
Diamond Drill Carbon Co.

Brazilian Mica:
Diamond Drill Carbon Co.

Buggies, Mine Car (Steel)
Hendrick Manufacturing Co

Brazilian Ballas:
Diamond Drill Carbon Co.

Brazilian Rock Crystal:
Diamond Drill Carbon Co.

Brazilian Tourmalines:
Diamond Drill Carbon Co.

Brazilian Aquamarines:
Diamond Drill Carbon Co.

Bridges—Man Trolley and Rope Operated—Material Handling:
Canadian Mead-Morrison Co., Limited

Bronze, Manganese, Perforated and Plain:
Hendrick Manufacturing Co.

Buckets:
Canadian Ingersoll-Rand Co., Ltd
Canadian Mead-Morrison Co., Limited
The Electric Steel & Metals Co
R. T. Gilman & Co.
Hendrick Manufacturing Co
Canadian Link-Belt Co., Ltd.
Marsh Engineering Works
Mussens, Ltd.
MacKinnon Steel Co., Ltd
Northern Canada Supply Co.
Fraser & Chalmers of Canada, Ltd
The Wabi Iron Works

Buckets, Elevator:
Canadian Link-Belt Co., Ltd
Hendrick Mfg. Co
Peacock Brothers Limited.

Cable—Aerial and Underground:
Canada Wire & Cable Co
Northern Canada Supply Co
Standard Underground Cable Co. of Canada, Ltd
Peacock Brothers, Limited

Cableways:
Canadian Mead-Morrison Co., Limited
Fraser & Chalmers of Canada, Ltd
Mussens, Ltd.
The Wabi Iron Works
R. T. Gilman & Co.

Cages:
Canadian Ingersoll-Rand Co., Ltd., Montreal, Que
Northern Canada Supply Co
Fraser & Chalmers of Canada, Ltd
The Electric Steel & Metals Co
The Mine & Smelter Supply Co.
Mussens, Ltd.
The Wabi Iron Works

able platinum. Longworth is starting work on his claims, and will have a number of other assays made to ascertain whether the platinum content is of commercial value.

A second gold-bearing vein has been located some 225 feet from the main vein on the McKeller mine. This vein is over fifteen feet wide.

West Shining Tree Camp.

Men and material is still going into the West Shining Tree camps, and there is every indication of a real mining boom, and something a little different from the other booms attempted for this camp. Hitherto the advance has been retarded materially by lack of transportation, but the Ontario Roads Department has about completed its road in from the railway and the situation is much better.

There are many signs pointing to a boom.

The Wasapika Consolidated is well financed now and is pushing development. A two-hundred-ton mill is to be erected, the contract having been placed. The first unit of 100 tons will likely be in operation before the end of the year.

On the White Rock, Sudbury controlled, the construction of a five-stamp mill is already far advanced, and this mill hoped to be the camp's first producer.

The Atlas is also reported to be in better shape now to go ahead as a mining company. It is understood that this was made possible by the purchase of a block of stock by the U. S. interests. It is planned to undertake extensive operations. A. M. Bilksy, former manager, has transferred his interests and I. Singer, Toronto, is now secretary.

The Herrick is developing and also the Wekenda, and the Churchill Company should soon start.

Besides the foregoing, there are many other promising properties in the camp. Thre is a bright prospect of a large gold-production and a great many old prospectors continue to work on claims. Many of these hold much promise and as soon as money eases, it would not be surprising to learn of the launching of several new companies.

Good Ore at Dome Mines.

During the past few weeks there have been persistent rumors that a very large body of high-grade ore has been opened up recently at the Dome mine. No official statement concerning it has yet been given out; but shareholders expect to find in the report to be issued this month confirmation of the statements that developments of major importance have taken place.—R. E.H.

EDITORIAL

CANADA'S INTEREST IN ASBESTOS MANUFACTURE.

Elsewhere in this issue will be found an excerpt from the remarks of the Chairman of Bell's United Asbestos in London, which are of serious import to Canada as the principal producer of the world's asbestos. The high tariff which is proposed by the United States against importations into that country of manufactured asbestos has led this leading English manufacturer to seriously consider the opening of a factory in the United States. Canada can hardly remain a disinterested spectator of a condition which permits of such a proposal. This journal has not hitherto been able to see clearly how Canada could profit, as the country certainly should profit, from its predominant position as a producer of high-grade asbestos. The difficulty of manufacturing finished products from crude asbestos in Canada consists in the fact that it is a process of assemblage rather than making a uniform product from a raw material. So far as this journal is aware, the only working up of crude asbestos in Canada—with the possible exception of one small textile-making branch of a United States firm—is in the manufacture of tiling and corrugated sheeting at Lachine, near Montreal. In the three year period 1917 to 1919, Quebec produced 89 percent of the world's asbestos and it is therefore understandable that the government of Quebec should have contemplated an export tax on crude asbestos for the purpose of encouraging the manufacturing of finished asbestos goods in Canada. This is a procedure, however, which will require very careful consideration as it is not at all certain that it would have the effect desired. If asbestos manufacture is to grow up in Canada it will have to do so as the result of private enterprise a development that would logically intimate with the Canadian asbestos companies themselves. The spectacle of one of the largest and most experienced asbestos companies in Britain building a factory to utilise Canadian asbestos in the United States is, however, not one that the Province of Quebec can be expected to view with equanimity. The place for such a factory is in Quebec, and the proposal is one that is likely to focus attention in a very definite way upon a matter in which public opinion in Quebec has as yet been only mildly interested. The asbestos companies in Canada, if they are wise, will take the initiative, as by doing so they may avoid the embarrassment which will follow when the public has apprehended the meaning of a squabble between United States and English companies over the profitable uses of a product that the world must have and which Canada controls in virtual entirety at this time, although benefitting therefrom only as an exporter of raw material.

THE BRITISH COAL STRIKE.

George Roberts, a British labour member of Parliament, and former Food Controller, has stated the coal strike in Britain is being prolonged by the cowardice of the miners' leaders in not telling the miners the truth. Mr. Roberts, however, told the truth.

The irresponsibility of the miners' leaders has been not only the cause of the prolongation of the coal strike, but of its inception. The right of the leaders of the miners to pose as plenipotentiaries of the men they undertook to advise and represent never existed, and the tragedy of the situation today is that the necessity of the leaders to save their own faces is the obstacle preventing immediate compromise of the strike.

The leaders of the miners in the first instance, knowing the impoverished condition of the union treasury, advised against a strike. Later the leaders advised against withdrawal of the maintenance forces at the mines. In neither instance were their wishes followed, and they are afraid now to advise dropping of the pool proposal and acceptance of a wage basis that will give the lowest class of labourer in the poorest mine district a wage of ten shillings a day, and the opportunity to earn wages over one hundred percent greater than pre-war wages, and much in advance of other classes of manual labour in Britain.

The inability of any responsible government to pool the revenues of private owners without authorisation of such a revolutionary innovation by vote of a general election, must have been fully realised by the miners' leaders, yet they preferred to place a political demand of this nature ahead of any consideration of questions of wages and hours of work, on this untenable ground advised a strike of all coal miners in Britain, and asked the assistance of all organized labour through the pressure upon the voters of that most desperate expedient

of modern times, the general strike. The miners' leaders, proved by the actions of their own followers to be capable of initiating policies only, but not of controlling the union membership; were actually prepared to imperil the life and comfort of every individual in the State to impose acceptance of an untried economic theory applicable to one industry only out of many thousands of industries. They proposed this dangerous experiment, they hazarded a strike of miners, attempted a general strike, and have appealed for outside assistance, and each successive step they have taken has been to save themselves from the consequences of the initial error. It is a pity to see so loyal and worthy a membership as comprises the Miners' Federation following policies they do not understand; forced to expend their undoubted powers of endurance and fighting abilities in an untenable cause, and debarred from a settlement that they eagerly desire, because the leaders dare not expose their errors.

Britain is at this time a much-harrassed country. Had the justice of the miners' cause been admitted by the public the strike would now have been over, but the silence of the public and the unusual reticence of the British press regarding the inconvenience, financial hardship and physical suffering, that the public is now undergoing, is in itself a most significant public condemnation of the miners' attitude. The situation, is however, in nothing more serious than in the absence of responsible leaders among the miners themselves, dominant enough to tell the miners the truth and to advise a compromise that will admit the initial error of the leaders.

The British coal miners' strike was not a strike for wages and working conditions. It was a strike to compel acceptance of a new political principle, by duress of a blockade of all production and transport in Britain. There is another term for this kind. of action. It is possibly better not to name it, but the British public has interpreted it correctly, and is now anxiously waiting the representative of the miners who will expound it to them also, and will be courageous enough to trust the undoubted good-sense and patriotism of the miners to abandon an unjustifiable course as soon as they are told the truth.

THE COMMISSION OF CONSERVATION.

In cancelling the Commission of Conservation it would have been much better had the Government's spokesman refrained from some very unkind and unnecessary aspersions upon the Commission's conception of its duties and its zeal in carrying them out.

There is a very considerable inconsistency in the action of the Government in simultaneously destroying the Commission of Conservation and establishing the Research Council. The scope of the work proposed to be done by the last-named body does not replace nor conflict with that done by the Commission of Conservation. If it is considered necessary at this time to abolish the Commission of Conservation it is an admission that the original appointment was a mistake. The statement is made that the publications of the Commission duplicated those of permanent government departments, but reference to the actual publications will show that the Commission in many cases has coordinated and collected in readable and impressive form much information that was scattered throughout the technical literature of years, and was in large part inaccessible to the public. The work of the Commission in regard to water-powers, forest resources, fisheries and fuel resources, is very largely responsible for the more intelligent interest of the public in natural resources, and this is due to the viewpoint of the Commission, which loyally interpreted the scope of its parliamentary warrant. Its work was to awaken public interest, to decry waste, to urge efficient use of resources.

The opinion of the Senate on a matter of this kind is always valuable, because it proceeds from a mature and detached vision, and when Senator Nicholls recently stated that the Commission "had rendered signal service to Canada" he spoke, as did Senator Edwards, as a man of affairs and some achievement in technical enterprises.

The scope of the work proposed to be done by the Research Council was outlined in a memorandum that was published in our last issue, and on persuing the memorandum it is impossible to avoid an uneasy feeling that if this body devotes itself to its duties with the conscientious zeal that marked the policy of the Commission of Conservation, some future government exponent will one day arise and criticise a future Research Council much as the Commission of Conservation was recently read out.

Any criticism that is justly levelled at the Commission of Conservation should be put upon the persons that created that body and charged it with certain duties, because the contention of those who have abolished it is not that the Commission did not function, but that its functions had become too provocative and were stirring things up too relentlessly. To be the keeper of the country's conscience in regard to natural resources will always be found to be a thankless task, bringing to those who keep reminding us of our economic sins, more kicks than halfpence.

THE GOLD PRODUCER SHOULD NOT BE TAXED.

Increase in gold production is, beyond question, very much to be desired. It is in the interest of Canada that we should develop all our promising gold deposits and extract from them all the gold that can be profitably mined. Any burden placed on the producer must result in the loss of much potential wealth. Every cent added to the cost of mining operations means that tons of ore must be left unworked. The gold miner, unlike the dealer in most commodities, is not permitted to increase the price of his product to meet tax impositions and is simply forced to discontinue producing gold that the tax makes unprofitable.

Taxes affect production of gold at all mines in the same manner. To lessen the profits of the most successful mining companies can only result in thousands of tons of ore being left unmined. Even in cases where very large profits are being made it is unwise to tax the producer, for the recipients of the profits and of the millions spent by the operating companies will be subject to taxation like any other citizen. Where large profits are being made the removal of taxes will always result in additions to the production of gold, for in every big gold-mine there is partially developed many tons of ore that might be mined if taxes were removed, but which will never be mined if it cannot be profitably done while the extraction of the higher-grade ore is proceeding. The utilization of such ore would bring comparatively little profit to shareholders for it would barely pay the cost of extraction; but so long as it pays its cost, hundreds of workmen would find profitable employment mining ore which will be of no use to anyone if burdens are placed on the producers.

The proposal to increase taxes on mining company profits has been strongly opposed and the Ontario Government has evidently been convinced that it would be unwise. If the subject were fully understood by the general public there can be little doubt that Governments would find it a wise policy to come out strongly in favor of proposals to help to increase gold production, by removing all taxes on profits of gold-mining companies.

Ontario is particularly favored with gold deposits and will derive great wealth from the industry if the Government will realize the possibilities and will encourage production. It is often claimed by Governments that they are desirous of encouraging production, but cannot easily find ways of doing so. The Ontario Government can give a great impetus to gold mining, make greater use of the known resources and stimulate development of others by freeing gold producers from taxes. This will not mean that the necessary revenue will be lost, but that it will be derived indirectly from gold mining, just as it is from our manufacturing and other industries. The individuals who share the disbursements of the operating companies whether they be shareholders, employees, manufacturers of mining machinery or supplies, merchants, or others who benefit from mining operations, will not be relieved from taxation, but the industry will be developed on a much larger scale and every mine now operating will be given a longer and more productive life.

Casual attention to the subject will not likely result in departure from the present tax gatherers' method of taking money from those who have it, regardless of the future. If a careful study of the possibilities increasing gold production were made, however, and of the resulting benefits to the community, the probable result would be a declaration in favor of removing all tax burdens from gold producers.—R. E. H.

ENGLISH ASBESTOS MANUFACTURERS CONTEMPLATE FACTORIES IN THE UNITED STATES.

At the annual meeting of the shareholders of Bell's United Asbestos, being the 33rd ordinary general meeting in London, the Chairman, Mr. J. Alfred Fisher mentioned that the Company's export trade was being threatened by high protective tariffs in most countries, and in lesser degree by some of the self-governing Dominions. In regard to the United States, the principal absorber of Canadian crude asbestos, Mr. Fisher stated:

"The most striking case, however, is that of America where an attempt is now being made to impose an entirely prohibitive tariff in place of the existing import duty of 20 per cent. ad valorem. This is high enough indeed, and practically shuts out trade, but the new tariffs proposed are so remarkable as to be worthy of mention. Take, for instance, asbestos yarn of ordinary quality selling here for two or three shillings per pound. American manufacturers are urging that a duty be put upon this article of $1.75 and/or 50 cents per pound, or say from 100 to 300 per cent. The supporters of this extraordinary proposal, however, give manufacturers on this side a good advertisement when they base their claim upon the statement that while they have to pay their workers higher rates than are paid in Europe, they can only spin yarn from the longest asbestos procurable, costing them $3,000 per ton, or 6s. 3d. per pound at the normal rate of exchange. This class of fibre represents less than 1 per cent. of the total Canadian production.

The prices charged by American manufacturers for asbestos goods even now are very high. Is it conceivable that they wish to persuade their Customs authorities that they are unable to utilize less costly grades of spinning fibre that are available and from which they must surely know that it is quite possible with proper skill to make goods of the best quality?

It would appear to be their object not to protect themselves from loss, but to make sure of keeping British manufacturers out of their market altogether (although they have a free market here), and to increase their already large margins and make American consumers pay the bill.

If their proposals are adopted this company would be justified in seriously considering the question of starting a factory in the United States where we have important connections. The difference in labour cost is not serious having regard to the high rates now paid here to asbestos workers.

It is obvious that the present ad valorem duty of 20 per cent. should be ample to cover the increased wages cost in the States, and if we are so much ahead of our American friends in the art of spinning asbestos fibre as the statements to the Customs authorities imply, then we should have a good prospect of success, and I purpose sailing for New York in a few days to go into these questions.

GOLD OCCURRENCE AT KAZUBAZU, QUEBEC, UNCONFIRMED

The Superintendent of Mines at Quebec, [illegible] ing the location of the reported gold occurrence at Kazubazu, is unable to confirm the [illegible] at this point and states that [illegible] did not disclose other gold or silver minerals.

The Mackenzie Oilfield of Northern Canada.

A Résumé of the Paper presented on 27th April, 1921 before the Institution of Petroleum Technologists, in London.

By Dr. T. O. BOSWORTH, M.A., F.G.S., F.R.G.S.

(From "The Petroleum Times.")

Some years ago I had the privilege of saying a few words before the Institution about the prospective oilfields which had been outlined in Northern Canada during my geological exploration in 1914.

The Mackenzie oilfield, which is now the subject of so much attention, was the most northern of those fields, and the flowing well which was recently "brought in" is the No. 1 test well which was located there seven years ago.

This "Discovery Oilwell" is situated on the right bank of the Mackenzie River, some 45 miles beyond the little trading post known as Fort Norman, and within about 90 miles of the Arctic Circle. It is the first well drilled in the North-West territory, and the most northern oil well in the world.

From Edmonton, the nearest large town, the distance to the oilfield is about 950 miles north-westward, in a straight line.

Almost immediately north of this city begins the great forest of spruce and poplar—one of the largest forests in the world—extending to the Arctic Ocean, and covering half the North American continent.

Three hundred miles beyond Edmonton the roads and railways terminate, and travel is almost entirely restricted to the great lanes through the forest which the rivers provide.

These rivers—the Athabasca and the Peace—unite to form the Mackenzie River, which flows northward to the Arctic Ocean.

It is only during the summer months that these northern rivers are open.

On both the Athabasca and the Peace the ice goes at the end of April, and on the Mackenzie it breaks up in the latter part of May. It is the ice on the Great Slave Lake which delays the transportation, for this generally remains until the middle of June.

The Mackenzie River remains open for navigation for about four and a-half months, but during October the winter is advancing from the north, and those who do not wish to stay must hasten southward to avoid being frozen in.

These great rivers are much alike in character—all being wide and shallow. At low stages of the water their channels are not to be depended on for boats of more than six feet draught.

Until the oilfield is further proven and developed the oil will be brought southward along the waterway to the railroads of Alberta. For this purpose motor barges of several hundred tons capacity can be employed. Two fleets of these vessels will be required—one operating north of the Smith portage and the other south of it.

If the oilfields fulfils present hopes and expectations, the transportation of the oil doubtless will in due course be accomplished by pipeline, and already several schemes are under consideration for piping the oil to one of the inlets on the Pacific Coast. The shortest distance to tidewater is 550 miles. Such a pipeline would not be longer than some of those already operating in the United States, but owing to the wild country to be traversed, the cost is estimated in millions of dollars.

The Devonian formations are spread over a large part of Western Canada, but about three-quarters of the area is thickly overlain by the Cretaceous deposits.

The eastern margin of the sheet of Devonian rocks crops out in the Palaeozoic escarpment of Manitoba. The line of it passes northward by Lake Winnipeg, Lake Athabasca, Great Slave Lake and Great Bear Lake, to the Arctic coast.

On the west side of the Devonian area the beds are upfolded in the Rocky Mountains.

Between their escarpment on the east and their folds on the west the Devonian strata are thought to be more or less continuous and undisturbed.

Thus in southern Alberta and southern Saskatchewan, the great sheet of Devonian strata underlying the Cretaceous is believed to be practically horizontal.

In northern Alberta, as we travel northward down the Athabasca or the Peace, where the Devonian is here and there exposed to view, we see that here too the limestones have a general horizontal attitude, though they also show many small gentle undulations.

Farther northward, in the North-West territory, the same general horizontality is observed in the scanty exposures around the western end of Great Slave Lake.

Continuing on the Mackenzie River, the first 250 miles of the valley, from Great Slave Lake to the mouth of the Nahanni, apparently are occupied by horizontal Devonian rocks. In this part of its course the river flows W.N.W. between low banks, in which only a few small exposures of greenish shales are seen.

There seems to have been a general idea that this horizontal attitude of the Devonian was maintained throughout all the Mackenzie Valley. This, however, is far from being the case.

At Nahanni River, about half-way between Fort Simpson and Fort Wrigley, the river had closely approached the Mackenzie Mountain range, and is sharply deflected northwards. At this place folded rocks of which part presumably are Devonian, are visible from the river in Mount Camsell and other hills.

Proceeding northward a further 70 miles down the river to Fort Wrigley, the Mackenzie Mountains recede from view on the west side, whilst on the east side we see, and soon approach, the Franklin range.

At Fort Wrigley, Rock-by-the-River-Side, etc., the river is in contact with outlying parts of these mountains, and here again folded Devonian rocks are visible.

From Fort Wrigley to Fort Norman the river proceeds on a N.N.W. course for some 130 miles, gradually drawing out of sight of the Franklin range.

After passing Fort Norman the river comes in contact with another mountain system—referred to here as the Limestone Mountains.

These mountains, which consist of anticlinal folds of

Devonian rocks, are encountered by the river for a distance of a hundred miles.

It is in this territory that the favorable indications and structural conditions were found which have led to the recent strike of oil. This is the site of the new oilfield.

Beyond the Limestone Mountains the river passes on to the Ramparts, and through them to Fort Good Hope. Here, and for more than 100 miles beyond, the Devonian is much exposed, but the beds lie horizontally, and no further folding is discerned.

A few miles beyond Fort Norman the Mackenzie turns sharply to north-westward, so as to flow along the south-west flank of the Limestone Mountain range.

This straight course, known as the Long Reach, is maintained for 75 miles, parallel with the range and a few miles from it. The river then turns northward, and in a distance of 25 miles it cuts across the trend of the mountains at their western end.

The Devonian strata of the Limestone Mountain district have been thrown into a series of bold asymmetrical folds, whose axes plunge up and down, steeply and frequently.

In the synclines the soft Camp Creek Series and Fort Creek shales give rise to low ground. But wherever the upward pitchings of the anticlinal axes bring the arches of the Beavertail limestone up above the general level of the land, the denudation has developed out the arches as conspicuous anticlinal hills.

Four main anticlines are thus revealed where the Mackenzie River crosses the folds. At this place all of them are pitching down toward the west. In order from south to north, they have been named (by the author): Wolverine Anticline, East Mountain Anticline, Bat Hills Anticline, and Beavertail Anticline.

The four axes lie roughly parallel, at intervals of about seven miles. Their direction, where the river crosses them, is slightly north of east; but on the east side of the river they bend round to a E.S.E. course, which is perhaps their more important direction.

These four main anticlines are very much alike, each forming a line of more or less discontinuous limestone hills, exceeding 1,000 ft. in height.

In each of these anticlinal ranges a core of the grey barren limestones, or the Fort Norman limestones, is laid bare in the parts where the axis rises to its maximum height.

On each of them the bituminous Beavertail limestone forms steep dip-slopes, and generally it is also seen forming conspicuous arches on some parts of the crests.

Low down on the flanks the Fort Creek shales are found followed by the soft Camp Creek beds.

Near the axes the strata at the core are very steeply inclined, but a mile or two away, on the flanks of the anticlines, the dip is 15° to 35°.

It was the remarkable character of the Fort Creek shales and Beavertail limestone, rather than the oil seepages which led to a favourable view of the prospects in this field. For here, extending over a large region, we have 1,000 to 1,500 ft. of highly bituminous rocks, which obviously are a potential source for the generation of a great quantity of petroleum. These limestones and shales are black with bituminous material, which appears to be present, not as a migratory but as a fixed constituent. In some places where these beds are much exposed the bituminous odour is so strong that it may be noticed at a distance of half a mile. The bituminous shales are undergoing slow combustion at their outcrop, and often they are burnt to a bright brick-red colour, or even to a grey colour, becoming so hard that they clink when struck. In several localities there are conspicuous cliffs of these bright red rocks over 100 ft. high.

Fluid oil is not visible in the bituminous rocks, though where they pass under water some liberation of gas is seen. But the oil might reasonably be expected in the porous beds of the overlying thick series of clay shales and sandstones, and also there was a good chance that at depth, and under favourable structure, accumulations of petroleum might occur within the black shales and limestones themselves.

After study of the bituminous beds the sand of the overlying Camp Creek Series were searched for oil. At each place examined, either seepages were found or the presence of oil was detected on crushing the rock under water.

The principal seepages occur on the shores of the Long Reach, where the river flows for 75 miles along the outcrop of the Camp Creek Series.

Near the mouth of Camp Creek (which at first we called Oil Creek) the seepages are conspicuous for a distance of two and a-half miles. On digging in the river gravel the outcrops of the green oil-sands are exposed, and the oil could be collected in considerable amount. Further out in the river much oil rises up to the surface of the water, and in winter it collects, forming pools in the ice.

Extending over many thousands of square miles, we have 1,000 ft. or more of richly bituminous beds. And overlying these rocks there are 2,000 ft. of shale and sandstones, from which seepages of oil arise. Further, this mass of petroliferous deposits is traversed by large anticlinal folds.

The high parts of the anticlinal hills are not now favourable territory, for there the oil-bearing beds have been denuded away. But on the flanks of the folds and on certain low parts of the crests, and also on the minor structures, the petroliferous beds are more or less intact.

Thus there are many places where satisfactory structural conditions occur and pools of oil are likely to be found.

The oil has a paraffin base and is of high quality. The seepage oil, obtained on digging in the outcrop of the Camp Creek beds, has a greenish black colour and a strong paraffin smell. The specific gravity is .905. The crude oil from the well is of light colour, low specific gravity, high gasoline content, and low cold test.

An analysis made at the Alberta University has been quoted as follows:

Specific gravity	845	Baumé
Distillation 70–150° C.	22.5	per cent
150–300° C.	38.5	"
300–350° C.	33.9	"
350–375° C.	4.1	"
Loss	1.0	"

Thus in commercial terms the oil consists of—

Gasoline	22.5 per cent
Illuminating oil	38.5 "
Light lubricants	33.9 "
Medium lubricants	4.1 "

Within the region here discussed the petroleum appears to have been first recorded about a century ago by Sir John Franklin, who saw, near Bear Mountain, "sulphurous springs and streams of mineral pitch."

It was not until 1919 that a drilling outfit was conveyed into the North West territory, the oil claims hav-

ing been acquired by the Imperial Oil Company, who were conducting an exhaustive search for oil throughout Canada.

The location of this first test well was chosen in 1914, as a site where a hole of moderate depth could not fail to penetrate the several petroliferous formations which had been found.

The well is on the river bank about half-way down the Long Reach, near the mouth of Camp Creek, where there are copious seepages of oil.

The well was drilled during the summer of 1921. Almost from the start oil was coming into the hole, and before a depth of 100 ft. was reached a yield of five or ten barrels a day could be obtained.

After passing from the Camp Creek Series into the dark Fort Creek shales the oil showings still continued, until at a depth of 738 ft. a string flow of oil was encountered which spouted to a height of 70 ft. After about ten minutes the well was capped. Some hundreds of barrels of oil issued from the well before it was finally shut in, but no dependable estimate of its capacity can yet be made. It is thought that the initial output will be at least 500 barrels a day.

But progress in the West is swift. A number of drilling machines already are on their way to the north —and during the coming summer the Mackenzie oilfield will be the scene of much activity.

COAL DUST IS GOLD DUST.

At the conference arranged by the Higher Production Council at the Efficiency Exhibition at Olympia, the subject of "Fuel Efficiency," with special reference to coal and gas, was discussed.

Sir Richard Redmayne chairman of the Imperial Mineral Resources Bureau, and late Chief Inspector of Mines, presided, and said the object of the conference was to consider the best method of using our greatest national asset — coal. Many people were hoping and expecting to see coal fuel at the price it was before the war. It might fall temporarily, but that it would remain for any length of time at a pre-war price he did not for a moment believe. The air and object of scientific men was to endeavour to work out some method of commercially possible low-temperature carbonisation by which by-products could be recovered, and a fuel left which was capable of being used for domestic purposes. He referred to the system of pulverised fuel which had been so largely applied in America and to the still more recent mixture of pulverized coal and oil known as colloidal fuel. There was no doubt that from the tests he had himself seen, colloidal fuel had come to stay. Bulk for bulk it gave practically the same results as oil, and one of its advantages was that it enabled vast deposits of coal of low calorific value, which existed in some of the Dominions, to be utilized.

Mr. John Drummond Paton (Manchester), in a paper on the subject, said that in 1919 and 1920 coal dust had become gold dust and as gold was the basis of British industry and coal was the nearest approach to gold we should utilize every ounce of coal to the extent of its maximum value. If coal dust could be utilized in many cases inferior coal might be found even of higher value, because of the oil it contained, than the coal which was looked upon as good coal. Eventually, he remarked, we might possibly get all the industrial power we needed from the coal mines in this country.

PORT ARTHUR NOTES.

J. J. O'CONNER.

The Palatine Mining & Development Company have filed an application with the city Council of Port Arthur, for the purchase of two hundred acres of land, owned by the city, and situate adjoining the Provincial Paper Mills, on the waterfront, for the purpose of erecting a modern ore-dock, and other facilities required in the carrying out of their iron and steel undertakings at this point.

The Company's engineers are preparing plans showing the proposed improvements contemplated, when these are completed it is altogether likely that the Council will transfer the property to the company, on the terms of their application.

A number of prominent mining men have visited Port Arthur during the past week, in connection with various mining enterprises now underway. These include Edward P. Scallon and W. R. Doell, of Crosby, Minn, both of whom have proceeded to the Atikokan Mine. A. E. Annis, of Orangeville, and F. Hazelwood, of Latonia, Fla. representing the Nepigon Developement Company. This company has over thirty thousand acres under oil and gas leases in this district. Their drilling-rigs have been shipped and are expected to arrive here in a few days, when drilling operations will be commenced. Prominent among these visitors were Joseph Mieynzinski, President of the Palatine Mining & Development Company, Stephen J. Napieralski, a leading iron-master of Des Plaines, Ill., and Mr. Vose, of the Hunt Engineering Corporation, Chicago. Mr. Vose is now at the Paulson Mine, in company with Arthur Mitchell, of Duluth. Thomas Krakowiak, metallurgist, of Chicago, was also among the number.

OXYGEN BREATHING-APPARATUS USED AT NEW GLASGOW FIRE.

The New Glasgow Hospital was recently the scene of a fire which was extinguished after a hard fight by the local fire brigade. Dense smoke in the upper floors hindered access to the seat of the fire, and the trained rescue corps from the Acadia Coal Company, equipped with oxygen breathing-apparatus, were of great assistance under these conditions. The Acadia Coal Company has probably made more effective use of oxygen breathing-apparatus in mine fires than any in Canada, and in this instance the apparatus seems to have been used in what is undoubtedly its chief function, namely, to give access to the seat of a fire in its initial stages. The location of such a fire, whether underground or on the surface, is, in principal, merely incidental.

NORTHERN PRODUCTION CO.

A meeting of shareholders of Northern Production Co. was held in Edmonton May 16, and it is expected that the outcome will be the reorganization of the company. The following were elected directors: Col. G. B. McLeod, president; Dr. Raymond Ghostley, J. E. Lundy, George Mills, Dr. John Jackson, F. Blake, and Wm. R. Angel. The name of the new company will be Edmonton and Athabasca Oil, Ltd.

PEACE RIVER OIL CO.

It is reported from Edmonton that the pioneer oil company of the Peace River district is preparing to begin operations again. This company, commonly known as the McArthur, has drilled three wells.

Enquiry by the British Columbia Government into the Production, Distribution and Sale of Coal.

(Digest by our Victoria Correspondent.

All phases of the coal mining industry of British Columbia and particularly that part of it centering in Vancouver Island and the lower Mainland, are dealt with exhaustively in the reports of Alexander Henderson, Commissioner appointed by the Provincial Government under the "Public Inquiries Act"; General R. G. E. Leckie, who was selected as a mining engineer to investigate the mining methods of the various collieries, the cost of production, etc.; and A. P. Foster, chartered accountant, who was commissioned to scrutinize the records of the companies upon whose product the people of Vancouver, Victoria, and other provincial cities are chiefly dependent for the fuel needed for industrial and domestic fuel.

Recommendations of the Commissioner.

After a summary of the proceedings of the commission Mr. Henderson makes the following recommendations:

1. Introduce the use of the short ton in all Government compilations and endeavour to secure its use in all sales.

2. Require coal operators to furnish monthly returns of operating cost and sales realizations of their several mines. Forms could be furnished by the Department of Mines and the persons covered should be the same for all mines. The correctness of such returns should be verified by government audit assisted by government inspectors familiar with mining operations and costs. The balance sheets of the operators should be furnished to the government and examination should be made to determine the capital actually invested, upon which dividends and interest should be properly allowed.

3. Dealers should be licensed, not for revenue, but to compel compliance with conditions contained in the license safeguarding the public. They should also be required to make returns showing capital engaged, coal handled, operating cost, sales realizations, and profits received. These returns should be uniform and be subject to government audit and examination in the same way as in the case of the operators.

4. Dealers and all large users should make collection of stocks of coal in the summer season, when transportation is cheap and municipal bodies should encourage such collection.

5. Tests should be made and published, showing the analyses and characteristics of coal from all the mines of the Province. Endeavours should be made to see that one class of coal was not put on the market in the name of another. Further there should be established a standard by which to grade coal by its physical form. General Leckie in his recommendations has suggested how this should be done.

6. Dealers should be required to issue to the public regular lists setting forth the different grades of coal, the tests relating to them, the several uses to which the different coals may best be applied, and prices.

7. Consideration should be given to the advisability of appointing a fair weights and measures officer for the Province and he might be given supervision over similar civic officers and jurisdiction as to grades. Provincial police and civic police should be authorized to supplement the authority of the fair weights and measures officer in every possible way and a determined effort made by every means available to stamp out the practice of deception in weights and measures.

8. Supervision of construction of new buildings might include regard to convenience for accepting delivery of coal wood and other goods in bulk.

9. Combines which keep up the price of coal should be dissolved and the offenders prosecuted.

10. An enactment to compel the operators to furnish coal to any person demanding a quantity, not less than one carload of 40 tons and tendering payment therefor at the correct price, provided that the operators should not be required to furnish coal to such person in priority to orders previously given bona fide.

11. Study should be given to the question of introducing uses of coal that would obviate the waste of by-products and the public nuisances now suffered.

12. Consideration of the use of pulverised coal and the establishment of central plants for its production and introduction of automatic stokers.

13. An endeavour should be made to reduce freight rates both rail and water, from Nanaimo and other coal-shipping points to places taking coal and also to reduce rail-freights on coal from the Interior thus aiding in securing cheap coal from all sources.

It will be noted that in his ninth recommendation, Mr. Henderson makes rather a drastic suggestion in regard to action against combines, suspected of acting in such a way as to keep up the cost of coal, beyond a reasonable figure. On this point he says that it is his opinion that evidence adduced before him "clearly establishes that the prices paid by consumers have been excessively high". The price of $15.00 per ton for lump coal has never been justifiable.

He continues:—

"The evidence shows very clearly a combine among coal dealers in Vancouver to fix the price of coal. The Dealers Association does not appear to have discharged any other function which it might, except the function of keeping up the price of coal. The association could render invaluable aid in reducing the price of coal, if it adopted a regular system of transporting coal from the Island to Vancouver and also an economical system of delivery.

"There is further evidence that the coal operators will not usually sell coal to persons not coal dealers. This is a great aid to the dealers' combine and makes a steel-clad coal ring. The operators and dealers justify refusal to sell coal to others than dealers on the ground that it would not be fair to the dealers after having stocked up, to have the operators sell to those who otherwise might be customers of the dealers. They say that their practice in this regard is the same as generally prevails between wholesaler and retailer.

"There is undoubtedly some force in this argument but it must be pointed out that it operates as an aid to the dealers in keeping up prices and, if it does not bring the operators within the provisions of Section 498 of the Criminal Code under which the dealers are liable, it comes very closely to one of the offenses, against which that section is directed. If licenses are imposed on the dealers and returns required as I suggest, the evil probably would be removed. It might therefore be unwise to prosecute for past offenses but I certainly would recommend that any future infringement of the enactment should be properly proceeded against.

"A member of the Dealers' Association at Vancouver endeavoured to show that if the mine operators had restricted the sale of coal to a limited number of coal-dealers, an advance of one dollar per ton between pre-war days and the present would have sufficed to cover the increased cost of handling coal from mine delivery to delivery to customers, instead of the increase of $2.50 which actually has taken place. If this is correct, it is difficult to avoid the conclusion that the Dealers' Association has had it within its power to relieve customers of at least $1.50 increase by adopting correct methods of handling coal.

"The dealers have fixed uniform prices and have fixed them apparently not to meet the requirements of the most efficient among them but to ensure a profit to the least efficient. The public has lost the advantage of close competition in prices and the dealers who conduct their business intelligently and well while making improper profits have lost in the end by giving up the advantage to be gained by them in an open market from larger sales at lower profit.

"The evidence conclusively shows further that dealers frequently deliver short weight to consumers. This does not necessarily mean that there is a design to deliver short weight although in some instances there is evidence of that but it does show that the consumer suffers from short weight delivery whether the dealer and carter is in fault. The practice of short weighting should be put a stop to by a rigid prosecution of the offender, whether dealer or carter. A very few convictions would cure the evil."

Consultation of Miners, Dealers and Consumers Recommended.

Reference was made by Mr. Henderson to a suggestion made before the Commission that operators, dealers and consumers should meet and consult together with regard to the whole question of cost of coal production, transportation delivery, etc.

This idea he considers a good one, stating that it is not too much to hope that there could be devised "a delivery of coal by operators to dealers and by dealers to consumers, that would be more satisfactory to consumers and much cheaper without imposing on operators or dealers undue losses. The practice of endeavouring to reform by stormy methods, is, I believe, less likely to accomplish its object than reasonable consultation.

Mr. Henderson remarks that the operators and dealers are willing to enter into such consultation and expresses the opinion that the result would be reformation of some of the ways not only of operators and dealers, "but also of those of us who are consumers". He points out that the consumers would get new ideas on the subject of the best coal to use, the best mode of securing delivery and also the best mode of using it, particularly in furnaces. "No other communities in Canada", he asserts, "have such expensive modes of delivering coal, as Vancouver and Victoria".

Cost of Production.

Under cost of production, Mr. Henderson refers to the affairs of the two leading collieries of Vancouver Island, The Canadian Collieries (Dunsmuir), Limited, and the Canadian Western Fuel Company. He observed that a scrutiny of their financial records certainly shows that while the companies are doing fairly well now, their operations have not been highly remunerative in the past.

The following particulars are given with reference to these two companies:—

(*a*) *Canadian Collieries (Dunsmuir), Limited* :

This Company was incorporated originally with the following capitalization:

Common shares	$10,000,000
Preference shares	5,000,000
First Mortgage Gold Bonds	10,000,026
	25,000,026
Accrued Bond Interest	3,799,888
	28,799,914

The Company was re-organized recently as follows:

Common shares	1,127,000
Preferred shares	4,900,000
"A" Debenture Stock	5,000,000
"B" Debenture Stock	5,000,000
	$16,027,000

Up to date the Company has paid no interest on bonds and no dividends.

The operating figures of this Company for the year named are as follows:

1914-15	Loss	$316,036
1915-16	Loss	378,647
1916-17	Loss	348,222
1917-18	Loss	102,129
1918-19	Loss	3,804
1919-20	Profit	52,489
1920-21 (8 Mos.)	Profit	168,814

No provision has been made in the above figures for bad debt, head-office expense, bond interest, income-taxes or other charges not directly chargeable to operations.

Details of Coal Production Cost.

The cost of a ton of coal is stated as follows:

	1920-21 (8 Mos.)	Year 1919-1920.
Total mine-cost	$6.243	$5.600
Depreciation	.$00	.496
Depletion of coal area	.129	.126
Transportation, surface	.619	.596
Other charges (less credits)	.173	.035
Total cost per ton	7.664	6.783
Sale price per ton	8.095	6.870
Net profit per ton	.431	.087
Tons commercial coal sold	391,411	605,425

(*b*) *Canadian Western Fuel Company, Limited.*

This company was incorporated under the laws of British Columbia on May 9th, 1918. It purchased the assets and assumed the liabilities of Western Fuel Company, Limited. It has a capitalization of $3,250,000, and in 1920 made a profit of $388,555. Its sale of coal was 638,264 tons, of which 493,795 tons were sold in British Columbia. It sold at an average price of $7.125, made up as follows:

	Tons.	Average price.
Lump	380,961	$8.598
Nut	55,756	7.994
Pea	59,754	5.152
Slack	90,031	3.692
Washed Slack	51,762	3.590
	638,264	7.125

The cost of a ton of coal is stated as follows:

	Year 1920	Year 1919.
Total mine-costs	$5.951	$5.664
Depreciation	.279	.271
Depletion of coal area	.093	.123
Transportation, surface	.528	.509
Other charges (less credits)	.137	.147
Total cost per ton	6.988	6.420
Sale price per ton	7.718	6.383
Net profit per ton	.730	Loss .037
Tons commercial coal sold	531,695	483,157

Referring to the Granby Consolidated Mining, Smelting and Power Company, Limited the Commissioner points out that this Company only recently commenced production, that its coal operations are but ancillary to its smelting operations, that the major part of its output is used by itself and that only a small quantity has entered the market. Of the Middlesboro, Princeton, Fleming and Comox mines, it is stated that while they ultimately may be expected to send coal in quantities to the Vancouver market, their production at present is not large and much of it is taken up by the railroads and does not reach ordinary customers.

Wages and Management Not Open to Criticism.

In discussing the wages paid to coal miners, Mr. Henderson said "The wages paid are high, but there

is nothing connected with mining in this Province that is fixed on a fairer basis. Wages are re-adjusted at regular quarterly intervals by the High Cost of Living Commission, and rise and fall according to the rise and fall of the price of commodities essential to life.

"If all wages were fixed in the same way, that is to say, a fair basic wage to start with and then increase above that wage or reduction towards it as prices of commodities rose or fell, it would become evident very quickly that workmen were not unreasonable because their wages were very high but that those who controlled the prices of commodities were responsible.

"In this connection it must not be forgotten that coal mining in British Columbia, even more than elsewhere, is of a somewhat intermittent character and that employment is frequently not for the whole time, but is interrupted by idle days, often several in a week. This is trying for the workmen and bad for the operators, and probably can be cured only by increased demand for coal. It is mentioned as an incident, perhaps inevitable, and certainly resulting necessarily in higher wages than would be required were the employment constant for full time.

"I cannot refrain from remarking upon the evidence respecting conduct of mining operations on Vancouver Island. This evidence shows that the management is excellent, that the superintendents and others in charge are most experienced and intelligent men, and are familiar with the best and latest modes of mining, that the operations are well and efficiently conducted, and it reconciles one slightly to high prices, to learn that the provisions for the safety and welfare of the workmen are of the very best and that improvements are being constantly made. The evidence of this phase of the subject seem to me most satisfactory and convincing and is supported by General Leckie after a thorough investigation by him.

Supplies and materials have been and still are high in cost for mines as for other requirements. It must not be forgotten, however, that there is not much inducement to the operators at the present time to reduce operating costs. They are getting an extremely high price for their coal, and as long as that continues, they have little reason to complain of high wages or high prices for supplies.

Effect of Railway Freight Rates.

Taking up the question of cost of transportation, Mr Henderson observes that the freight charges, whether by rail or by water are high. By rail the rate is $1.65 per long ton, and by water about $.75. The water rate varies slightly, as transportation is carried on by independent tow companies and also by a number of dealers on their own account. Rail transportation has one advantage over the use of scows, in that it involves less handling of coal and occasions less pulverizing. It is suggested in this connection that transportation companies so far as concerned in the moving of coal in British Columbia, might be required to make returns showing operating costs, quantities carried, distances travelled and amounts realized for services.

"No constitutional difficulties", Mr. Henderson says, "would arise in the case of provincial companies. There might be great difficulties in exacting such returns from federal railways or navigation companies. My conclusion from the evidence submitted from this phase of the question, is that towing rates could be materially reduced."

It is explained that the report does not deal extensively with railway freight-rates affecting coal, as these, if too high, must be attacked before the Railway Commissioners. There was evidence, however, to show that without a reduction in freight rate really cheap coal cannot be obtained from the Interior mines.

Dealer's Spread.

As to the cost of coal to the dealers, the prices of the different grades F.O.B. the mines, are given as follows:

Prices	Lump.	Short tons.	Nut.	Pea.
On January, 1917.....	4.75	4.24	3.75	3.00
On December 1, 1920....	9.75	....	8.75	8.25
On February 6, 1921....	9.46	8.44	8.46	7.96

The additional cost of a number of Vancouver firms dealing in coal then are given and the Commissioner points out that from these the wharf, yard, and delivery expenses of the concerns mentioned varied in 1920 from $1.47 to $2.30, per short ton, and overhead expenses from $0.55 to $1.23. "The consumers", it is stated, "received no advantage by reason of this variation."

After referring to the fact that coal, when delivered by rail, is frequently short weight, and that while difficulty may have been experienced in obtaining redress, the railway companies, no doubt, would correct such shortages, if it were possible to have their attention called to it immediately. Mr. Henderson deals with the question of the cost to consumers, which comments already have been enumerated.

Industrial and not Domestic Coal-Consumption of most Importance.

In his introductory remarks, the Commissioner refers to the importance of the subject matter of the inquiry, because it must be recognized "that upon a cheap supply of bituminous must be built practically all industries". He points out that the great markets for this coal are the railroads, manufacturing industries, steamship bunkers, and coke and gas plants. These create the demands that make the market steady; the domestic consumption of coal is seasonal; the others are steady throughout the year. He says that as the interest of all those who consume coal, whether in large or small quantities, is advanced both directly and indirectly by cheap coal, he has endeavoured in his study of the subject to look at it from the larger and broader viewpoint.

Concluding this section of his report he says:

"Competition on the Pacific Coast in coal is apt to become very intense and this affords an additional reason for taking all legitimate steps in the direction of securing by every possible means cheap production, transportation and distribution.

"I have not gone into the great expense of an inquiry into the operating costs, output, sales realizations, and other matters connected with the coal mines in the portion of District 18 in British Columbia and under federal fuel control, further than to obtain prices of coal to consumers and railway rates to Vancouver. My reasons were that the special matters of inquiry arose, as I understand, on the complaint of citizens of Vancouver whose supply of coal does not come to any appreciable extent from District No. 18, and all the matters of inquiry have been or are being investigated by Federal authority and a duplication would be useless expense."

Comments of General Leckie, the Mining Engineer.

General R. G. E. Leckie, the mining engineer appointed in connection with the Commission, submits in his report recommendations which may be summarized as follows:

1. That legislation be enacted to deal with any combine formed for the purpose of maintaining a high price for coal.

2. That dealers should be licensed so that their operations may be conducted in the best interests of the public and that they should be limited in number, according to the requirements of the district they serve. This would eliminate unnecessary overhead expense.

3. That an effort should be made to secure special freight-rates for coal, in order that there might be closer competition in the larger markets between the different coal-fields.

4. That an effort should be made to eliminate the system of delivering coal in sacks, compelling consumers to make provision to receive coal in bulk.

5. That the calorific value, analyses, and the important characteristics of the different coal-seams mined in the Province should be officially established and made public for the benefit of the consumer.

6. That standard sizes of coal should be established officially. It is suggested that these sizes should be classified as Lump, Stove, Nut, Pea and Slack. The size of screen through which each of the first four mentioned should pass, is given, and as 25% ash, if unwashed and not more than 15%, if washed. Coal containing more than 25% ash should be sold as such without any restriction. It is further recommended in this connection "coal sold as per above classification and which on arrival at destination is found to contain more than 10% by weight of a size less that the classified coal which was ordered, shall be examined by some person, appointed for the purpose, and such rebate allowed the purchaser as occasion directs. By destination is meant delivery place, where the coal is delivered in bulk, by carload or scow, and any examination where such is demanded, must be made before the coal is unloaded from the car or scow."

7. That where the coal is sold in sacks, a set of scales must be carried on the same vehicle in which delivery is made to the customer.

8. That an official investigation be made into the question of the economical use of coal. This should include information as to the advantages of using mechanical stokers, so that the smaller sizes of fuel can be used where large coal is now required and also as to the possibilities of the utilization of pulverized coal. It is added "In connection with the economical use of coal the matter of saving by-products, such as gas, tar, benzol, from the coal should be considered. It is regrettable to think that such valuable products are being constantly wasted, and every exertion should be made to save them when such can be done economically."

9. That a short ton of 2,000 lbs. and not the long ton should be officially recognized as the standard unit of weight as applied to coal.

General Leckie deals exhaustively with the source of the coal supply of British Columbia, methods of production, treatment, transportation, distribution, geological conditions, and size and character of the coal seam.

Dealing with source of supply, he points out that Vancouver and New Westminster, Victoria, and the large municipalities of the Province get most of their domestic coal from Vancouver Island. For instance, Vancouver, New Westminster and districts are estimated to absorb 23,000 tons per month of Island coal.

He then goes on to describe the various Coast coal fields, dealing first with the Nanaimo area and giving some very interesting particulars of the Wellington, Newcastle, and Douglas seams. The calorific value of the Wellington coal is given as b. t. u. 13,261; of the Newcastle b. t. u. 12,951; of the Douglas b. t. u. 13,200. The Comox area next is dealt with and a typical analysis of washed Comox coal is shown to have a calorific value b. t. u. 13,590.

Taking up the Nicola-Princeton field, it is shown by a typical analysis of the Middlesboro coal, to possess a calorific value of b. t. u. 11,720.

The methods of production are described in detail and in this connection, General Leckie says:—

"In all mines the safety of the men underground was given the greatest consideration. The government regulations in this respect are excellent and are conscientiously carried out. Nearly all the mines use electric lamps underground, and the arrangements for an adequate supply of air throughout the mine workings are first-class. The systematic inspection of the mines for the presence of gas is thorough."

An account is given of methods of transportation and of distribution. With reference to the latter, General Leckie recommends as the most efficient means of unloading, a portable conveyer rested on the scow, and the other was elevated above a screen on the dock. The coal is shovelled on to the conveyer and is carried by it to the screen, over which the coal passes directly into the sack set on the scales. It is emphasized that the consumers should be educated to the economical use of coal and not demand all lump when his purpose could be just as well served by taking a certain percentage of the smaller sizes.

Management of Mines is Excellent.

Under "General Remarks," and dealing with mine operations, General Leckie refers to certain criticisms suggested in the evidence with regard to the Vancouver Island mines. These, he says, were apparently made without knowledge of the actual conditions. He found efficient management; mining methods most suitable to local conditions; the use of coal-cutting machinery, wherever conditions would permit: the use of electric power, wherever economical installation could be effected (the Comox mines are operated exclusively by hydro-electric power), careful handling of the coal, to prevent breakage of lump; and preparation of the coal for the market well carried out. He states that approximately 40 per cent of the product is washed, while in the United States the average is less than 10 per cent. He adds, "Every consideration is shown for the safety of the men encouraged in all the mining localities, and good recreation ground provided."

Reasons for Increased Coal Cost.

Reasons for the high cost of coal as compared to the price per ton in 1914 are given as follows:

1. Increased cost of labour.

2. Exhaustion of the more cheaply-mined section of the coal seams and consequent gradual increase in distance to the working faces, entailing larger haulage-ways, which have to be kept up, and necessitating longer distances for the miners to travel to their work in working hours; in some cases in old mines, almost 20% of the time is taken up in this way.

3. To increase difficulties encountered underground in the way of "faults", "wants", and other irregularities in the formation of the seam.

4. To increased salaries and wages for management and in offices. These fixed expenses, however, vary per ton, approximately in inverse ratio to the coal produced.

5. To increase in price, placed on the coal to permit of a profit being made on the production by the principal operating companies; previously some of the principal companies have been operating at a loss.

6. To the increase in pay to officers and crews concerned in the transportation of the coal.

7. To the increased cost of fuel at the bunkers and of supplies.

8. To the increased cost of labour in handling, screening, sacking and delivering coal.

9. To increased salaries and other office expenses in connection with the dealers, firms. This includes increased rentals.

10. To the increased number of coal dealers engaged in coal business. This necessitates fixed expenses out of proportion to amount of coal handled. There apparently exists among the dealers an agreement to determine the selling price of coal and thus prevent the competition which might eliminate from the business those unable to handle coal cheaply.

11. To the great demand for lump coal exclusively, when a mixed product would serve the purpose equally well.

12. To the desire to have coal delivered in sacks, instead of in bulk. This is chiefly owing to the faulty construction in buildings; no arrangements being made to receive coal in bulk.

Report of the Chartered Accountant.

Interesting statistical information regarding the financial condition of the various collieries of Vancouver Island and the lower mainland, together with statements of the financial affairs of Vancouver and Victoria coal dealers, are given by Mr. A. P. Foster, Chartered Accountant, in his report.

In addition to giving details of the cost of mining coal at the collieries of the Canadian Dunsmuir Co. and the Western Fuel Co. (elsewhere quoted) Mr. Foster deals also with the Nanoose-Wellington Collieries, Ltd., the Granby Consolidated Mining, Smelting, and Power Co., Ltd., and refers to the mainland operators. With respect to the former, as their product does not materially affect the domestic market, it is not of special importance. Regarding the mainland operators, he points out that their output is so small as to be negligible.

In regard to the Canadian Collieries (Dunsmuir), Ltd., it is observed that this company is in a very serious financial condition. The deficit at 30th June, 1920, amounted to $4,934,377, and accrued bond interest at 30th June, 1920, represented a debt of $3,799,888. The printed accounts circulated to its shareholders contain reference to a plan of reorganization. This plan, it is stated, has ben carried into effect. It consists of writing down the ordinary share capital by 70 per cent. and, on the other hand, the capitalization of the interest owing to the bond-holders. The net result is that the capital of the company has been reduced by approximately $9,000,000.

Taking up the affairs of the Western Fuel Company it is pointed out that there are 32,500 shares of $100 each, held by residents of Canada and the United States, and that dividends in all amounting to $9.31 per share have been paid. In the year 1920 there was a net profit of $388,555. Provision has been made for the depletion of mines, at the rate of approximately $10 per ton and depreciation has been provided for, and a provision for contingencies at the rate of $0.05 per ton. This is considered sound accounting and in accordance with common practice. The combined capital and surplus of this company, as at 1st January, 1920, was $3,349,988, therefore the profit of $388,555 represents a return of 11.60 per cent. It has been stated that the company has been selling its product abroad at a less price than the local concerns, and for this reason Mr. Foster gives figures taken from the company's sales register, showing that both in 1920 and in 1921, the sales price outside the province, was the same as that to local dealers.

Particulars are given of the average price received per ton, the average cost and the average net profit of of the firms of Evans, Coleman and Evans; MacDonald, Marpole Company, Kirk and Company; McNeil, Welsh and Wilson and L. M. Deither Coal Company, Ltd., Vancouver, and the firms of J. Kingham and Company,

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The Canadian Western Fuel Co., of Nanaimo, B.C., has been re-organized as a $5,000,000 corporation to be known as the Western Fuel Corporation of Canada, Ltd. The head office will be in Nanaimo. It formerly was at San Francisco, Cal. but at the time of the last re-organization, in the first years of the War, was transferred to Nanaimo.

A MONTREAL LETTER.

By ALEXANDER GRAY.

What Gold Mines are Giving and Getting.

International amenities do not count for much when it comes to a matter of something other than gold being proferred in liquidation of obligations payable in the yellow metal. Theoretically, of course, the gold standard is fairly well established, and those who have gold are fortunate even if the penalties of adverse exchange are grievous. But it seems as though the American Chiele Company might have displayed a trifle more tact when it started out to compel the Somerville Paper Bag Company of Ontario to pay off a mortgage and interest on the same in gold. The Canadian Company tendered the amount due, $50,000, and $3,098 interest on it, in Canadian money. The Chiele Company adhered to the strict letter of the mortgage. Canadian currency having depreciated, the Chiele Company insisted upon receiving New York Funds. So a suit was instituted.

By and by the American company is within its rights, but the embargo placed upon gold until July 1st, 1922, and the fact that gold no longer is current in Canada, at least raises the question as to how gold mines are going to fare with their bullion, for which they are now getting a premium amounting to the difference in exchange on New York. It would be easy enough for the Somerville people to let the Chiele Company have New York funds, however much they dislike to fork over $5,000 or $6,000 more than the principal and interest. That is a misfortune Canadians doing business with the States have to undergo. At the same time, Canadian companies selling Canadian products to the States are not waiving their right to exact New York funds, thus obtaining a handsome premium.

As to the duration of this situation, authorities in the matter do not expect to see the equilibrium of international exchange restored altogether for some years. A re-arrangement of Great Britain's debt to the United States would favorably affect exchange, no doubt. The premium is rather prejudicial to American trade — and continental fiscal systems are so deranged their readjustment will be more or less evolutionary. Debtor nations have a long way to travel before they reach normal conditions. Great Britain can fund what it owes to the States, but Allied Nations of Europe cannot so easily deal with their debts to Great Britain. Consequently gold is to be in continuous demand, and more especially because continental countries worked their printing presses over-time. This will be a compensating factor for Canadian gold mines, pulp and paper and asbestos producers, who stipulate for New York funds.

The Exchange Premium on New Gold.

South African gold producers are alone in presenting what the premium upon their bullion amounts to by reason of exchange conditions. Possibly the $15,833,178 dollars in gold produced last year in Canada means a million and a half in special revenue. Only $1,642,000 was exported in gold bullion, gold bearing dust nuggets, gold in ore, etc. The remainder of more than ten million was purchased by the Ottawa Mint. Transvaal production continues about steady. The world at large last year accounted for seventy million sterling, taken at the standard value, as compared with ninety-five million sterling a few years ago. In April the premium upon Transvaal gold was 23.6 per cent. equal to £5 5 shillings and a penny per fine ounce. Since the establishment of a free market in gold, in July,

1919, workings costs advanced and offset some of the premium upon gold. While the premium lasts, however, gold producers may submit to excessive working costs. Otherwise many companies would be embarrassed.

How important is the gold premium is evidenced in recent reports from the Union Government Mines Department at South Africa. In January the increased value of Transvaal gold over standard price was £657,-227, or only £90,000 less than the value of the diamond output of the country. The total mineral production of the Union of South Africa in January, with gold at normal, was £4,030,741, and £4,687,968 with gold taken at estimated increased value. In February the excess realized was £522,783. A commentator points out that the premiums of 18s. 9d. per ounce amounts to considerable more than the diamond output, which was £469,749—about £4 per carat—and more than the coal output, valued at £426,951. The March premium on gold was £631,479. As to diamonds, the comparison is rather unfair; for diamond markets are too askew to permit of production to capacity. That the gold industry of South Africa is prospering, and that coal is keeping pace is unquestioned, but diamonds are not so lustrous. Gold is gilt-edged. In the first three months of this year it brought to the Transvaal mines an extra of £1,811,489. This is the tribute to mines that lead all those mineral industries of South Africa which last year paid £14,500,000 in white wages; £8,250,000 in native wages, and £18,000,000 for stores—a combined increase for the year of £5,000,000. In more ways than one gold mining pays, pays, pays.

Possible Re-Investment of South African Gold Revenues in Canadian Mines.

During a recent visit to Canada a noted Mining Engineer made the statement that there is a large amount of South African mining money at New York ready and willing to be invested. The sum specified is incredibly great, and yet South African mining groups, since they were conceded an open market for their bullion may have decided to let some of the proceeds therefrom remain on this side of the Atlantic. The same mining engineer also is alleged to have manifested disappointment over the character of the generality of Canadian proposals submitted to him. Capital is very scrupulous these days. Vendors and promoters have to write down their ideas as to the fitness of things.

THE LATE AMBROSE MONELL.

Canada lost a real patriotic friend by the all-too-early death of Ambrose Monell.

In Canada he had abiding faith; for Canadians he had lasting affection, an affection such as he was capable of cherishing.

His business methods always were constructive. Never did he give thought to a destructive purpose. Ably seconded by Mr. W. A. Bostwick, his successor in the presidency of the International Nickel Corporation of New Jersey, no finer type of scientific executive has devoted his superb judgment to the development of Canadian industry.

With Mr. Bostwick, they planned expansion. During the war he devoted the best that was in him to the furtherance of allied policies. What Messrs. Monell and Bostwick achieved will never be told by the former nor ascertained from the latter—the most reticent and unobtrusive of industrial chiefs.

Downing Street, Washington, Ottawa, the Quai D'Orsay, know—that will have to suffice. Through it all Mr. Monell preserved his characteristic buoyancy, whatever he undertook he never half-heartedly finished. That he was misunderstood at times—by a few Canadians—brought him regret; yet he could not cherish animosity nor resent insularity. That he died in his prime after distinguished service in the American air forces is more deplorable than the generality of those who thought they knew him comprehend.

He had wisdom and wealth beyond his years, but the probity of those years is his finest epitaph.

It was my privilege to have access to Ambrose Monell in thought as well as in deed. I recall that early morning chat in which he enthusiastically produced the personnel of those who followed his lead in subscribing to the capital of the Canadian Exploration Company. His actuating motive was to enlarge Canada's industrial map. Money—multi-millions beyond his initial needs—was available. The central idea was to combine Canadian and American forces, to unite international capital in developing a greater Canada. To my somewhat cynical remark that "if you are seeking to underwrite the Universe—you have the people on that list to do it—but I am afraid it is likely to be misinterpreted," Mr. Monell, who was too open-minded to do otherwise than think straight, demurred.

My off-hand comment rather disconcerted him. "Why," he argued, "should I be misunderstood. Anything is possible in Canada. We may find another Utah or Inspiration copper mine. Your western coal fields will invite large capital. I am going to try to do bigger things for Canadian mining industrialism.

Mr. Monell was true. He was misinterpreted in that instance, but he never deplored having done what was right. Small enterprises and little men he ignored. Chicanery he detested. When he and his assistants realized the Milleret Mine at Miller Lake was good enough for some but not big enough for others, a proposal was entertained. It was submitted by a party wishing to obtain control. Upon consultation, the price was made satisfactory, and the purchasers departed; but not before Mr. Monell had insisted as a pre-requisite, that the minority interest should be given the same terms.

Later, it occurred to Mr. Monell the intending purchasers might induce the minority interest to accept less than the majority was receiving. So, he wired to Elk Lake, had a special messenger sent to the Milleret —and the messenger reached the mine a short while ahead of the would-be purchasers—who intended to do as Mr. Monell surmised.

That was Ambrose Monell's clean-cut style. As a youth he was one of the Carnegie galaxy-steel-makers de luxe, as a man and millionaire he was superfine.

A despatch from Vancouver reporting the export of Vancouver Island coal to South Africa indicates that the excellent position of British Columbia ports as coal-distributing centres is becoming known. A study of the globe, and of the coal-possessing countries that have access to the Pacific Ocean, will show that Vancouver and Prince Rupert must some day become the shipping ports for Alberta and British Columbia mainland coal. The Panama Canal has also completely altered the strategic position of Vancouver with regard to access to countries bordering the Atlantic Ocean.

Northern Ontario Letter

THE SILVER MINES.

The Cobalt District.

The Mining Corporation of Canada will resume general operations on May 25th, Cobalt properties. The mine is in very good condition, particularly the Buffalo side, where a force of men has been engaged for some time on the work of preparing an outlet for the ore from the Buffalo mine to the mill on the adjoining Townsite mine. The mill is also in excellent shape, in fact is officially stated to be in the best condition in its history, the recent alterations and additions having added about fifty per cent to the capacity of the plant.

Recent reports regarding the discovery of a three-foot vein of high-grade ore at depth on the O'Brien mine, have been enquired into, and the "Journal" correspondent learns officially that there is not the slightest foundation for the report. "Unfortunately, the discovery exists only in the imagination of those who have reported it," is a remark which one of the O'Brien officials offered to the writer.

In an interview with F. L. Culver, president of the Beaver Consolidated Mines of Cobalt, it was learned that under present conditions no effort will be made to re-open the Beaver. Mr. Culver stated that the commercial end of the enterprise must be taken into consideration, and that under the present cost of producing silver and the low price which the metal commands on the markets, it would be profitable to undertake general operations at this time. In the meantime, however, the company seems to be in line to likely receive revenue at an early date from the Kirkland Lake mine, of which it controls approximately seven-eighths per cent, in addition to having upwards of $100,000 due in cash to the Beaver Consolidated Treasury from the Kirkland Lake Gold Mines.

The Nipissing mine continues to produce silver at the rate of about $150,000 a month. With the improvement which has taken place in the efficiency of the workers, and the lower cost of material, it is expected this company may reduce its operating costs somewhat further during the balance of the current year. This company has recently held the best record in point of low operating costs per ounce of silver produced, and it is believed the record may be still further added to.

The work of re-opening the Oxford Cobalt and the Victory Silver Mines, situated in the South-eastern Coleman, is proceeding satisfactorily. Concerning the Silver Cliff, nothing definite has so far been ascertained in respect to the reports that the property might be re-opened within a short time. It is learned, however, that the option held by the Colonial Company on that part of the property lying below a depth of 500 feet has been dropped, while the lease on the surface down to a depth of 500 feet which was held by the Northern Customs has also been dropped. These facts lend some weight to the reports that the Silver Cliff Company itself might decide to go ahead with work.

At the Conagas, upwards of 500 tons of ore is being handled daily, and the average recovery is about eight ounces of silver for each ton of ore treated. This would indicate a monthly production of about 120,000 ounces which, at 60 cents an ounce, would be at the rate of about $72,000 or at the rate of about $864,000 a year, not including the premium on United States funds for which the silver is being sold. It is by reason of the treatment of this large tonnage and by paying exceedingly strict attention to economy that the Conagas is is able to treat such low-grade ore as that containing only eight ounces of silver per ton.

The fifteenth annual statement has just been issued by the Peterson Lake Silver Cobalt Mining Company. It contains no surprises, and is quite along the lines as had generally been understood during the year.

W. A. Lamport states "In common with other mining companies we have experienced a very trying year. When the last annual report was sent out we were hopeful that the price of silver would continue around a dollar an ounce in which event we would have had considerable profit to show you on our operations from our low-grade ore, but the rapid fall in the price of silver to under 60 cents per ounce, made it impossible to continue operations and as stated in the manager's report we ceased operations altogether on the 18th December, 1920, and at the present time are not intending to resume the milling of our low grade ore until the price of silver has considerably advanced.

"At the time of the last annual report we had great hopes that our new mill and plant which we had been erecting and installing in conjunction with the Dominion Reduction Company, would be running at capacity before July 1st, 1920. We were, however, doomed to disappointment on account of the deliveries of our machinery being much delayed and when the mill was started on the 9th September, there were to be solved many milling problems referred to in the manager's report, that made it impossible to operate at capacity and necessitated a complete shut-down owing to shortage of power and the low price of silver early in November. We were able, however, to demonstrate that the silver content per ton of our tailings dump was going to run higher than estimates.

"In making our arrangements for the erection of a new mill and the installation of machinery we had received very favorable terms as to credit and have paid off part of our indebtedness, but there will be due a balance on our notes for plant and machinery of some $27,000 to be met in the months of June, July and August. For the purpose not only of discharging our obligations but of carrying forward our development work in very favorable territory, as pronounced by mining engineers, we sent a letter to shareholders on March 7th placing our situation before them and asking them to subscribe to our preference issue. The response has not been very satisfactory. We therefore now urge again upon the shareholders and in their own interests, the absolute necessity of meeting their obligations and for this purpose of taking up this very favorable issue. The directors have done their part and unless subscriptions are forthcoming the company will have to resort to some other method of financing or cease mining altogether although it has assets, actual, tangible and available when the time and opportunity offers, of great value."

In his statement C. V. Filteau, manager of the Peterson Lake summarises the progress made during 1920. Mr. Filteau states that 2,167 tons of low grade ore was shipped during the year, the average grade being a little over 24 ounces per ton, or containing a total of 53,527 ounces of silver. High grade shipments amounted to upwards of five tons containing a total of 13,994 ounces of silver. The total amount of silver taken from the mine during the year was 67,521 ounces.

As of the end of the year the ore reserves were estimated at 13,600 tons containing 126,000 ounces. Of this, 32,000 ounces lie at the 4th and 5th level [illegible]

while 80,000 ounces are contained in 10,000 tons of dumps at Cart Lake adjacent to the mill and 14,000 ounces in the Peterson Lake dump.

Mr. Filteau sums up the question of milling Peterson Lake tailings in these words: "It will necessitate an additional investment of about $4,000 to render the plant adequate to treat the objective of 10,000 tons a month, and resumption of operations on this tonnage basis would only be profitable in the event of a material increase in the price of silver taking into consideration the present reduction in working costs."

Elk Lake and Gowganda Field.

Arrangements are being made to re-open the Paragon-Hitchcock property near Elk Lake, as well as the Triangle Silver Mines in the Township of Auld (formerly known as the Kenabeek.)

It is also understood that the directors of the Regent Silver Mines are planning a trip to the property about the last of May with a view to arranging to resume operations on their Elk Lake property.

Advice has been received by Robert Gamble from Montreal to hold himself in readiness to start work on the Silver Bullion property at Gowganda.

THE GOLD MINES.

The Porcupine District.

It is understood that the Dome Mine is producing upwards of $200,000 a month and may exceed $250,000 a month when the mill is brought up to full capacity within a reasonably short time. Developments at depth continues favorable, and the average grade of the ore is now definitely much higher than early estimates indicated.

At the Hollinger, the weekly production amounts to close to $200,000. This is being achieved by treating about 3,200 tons of ore daily and recovering close to $9 per ton.

The McIntyre-Porcupine continues to produce between $175,000 and $185,000 a month. The mill treats an average of approximately 550 tons of ore daily. The machinery now on order, delivery of which is expected daily, will be installed as quickly as possible and before the end of the current year the mine is expected to be producing close to $9,000 daily from an average of about 900 tons daily. This would indicate that at the beginning of the coming year the mine will be in a position to produce gold at the rate of about $3,250,000 annually.

It is reported that negotiations are under way with a view to merging the properties of the Dome Lake Mining and Milling Company with the West Dome Consolidated. The properties adjoin each other, and on the West Dome there is a considerable tonnage of medium-grade ore in sight, while on the Dome Lake there is a mill which will be able to treat between 75 and 100 tons of ore daily. In some quarters the merger is believed to be assured, while among certain shareholders some doubt is still expressed.

Work on the property of the Goldale Mining Company is to be proceeded with immediately. This was originally in the hands of the Bewick-Moreing interests and is considered to have favorable prospective merit.

The entire entire Porcupine district seems to be alive with industry and the scope of the work exceeds the proportions reached in the previous best days of this field. It would appear as though this increase in activity is to continue for a long time as the work at the big producers increases and while reports keep coming in of new prospective work on outlying properties.

The Kirkland Lake District.

A party of visitors from London, England, accompanied by J. G. Latilla, have just concluded a visit to Tough-Oakes Mine at Kirkland Lake. Arrangements are being made to carry on operations on a big scale, and this mine, together with the adjoining Burnside which is also owned by the Kirkland Lake Proprietary (1919), Ltd., will join the producing list by the end of the present summer.

At the annual meeting of the Argonaut Gold, it was stated that a mine of moderate size is already assured, while the plan of further development work offers good promise of the property developing into one of quite considerable size.

Gold is reported to have been found in the township of Bryce near the Elk Lake branch of the T. & N. O. Railway. About fifty prospectors have gone in and a large number of mining claims have been staked.

Lake Shore Mines, Ltd.

Concerning the Lake Shore Mines, Ltd., of Kirkland Lake, a very great deal has been written unofficially, and comment of various shades and form has been bandied about, so much so that many people have a wrong impression of this mining company and the condition of its property.

The company has never endeavored to get publicity, nor has any effort been made to withold any valuable information from the public. These factors in themselves have tended to make the enterprise a favorite among mining men and that part of the public which speculates in mining shares.

Statements have been printed, pointing out that the orebodies are exceedingly wide, some forty feet in width being mentioned. This impression has been denied as a consequence of discussing the matter with officials, although the authors of the wrong impression proceeded to interpret the denial as an effort on the part of the statement to show that the Lake Shore orebodies are narrow. The fact is that the orebodies are not narrow neither are they forty feet in width.

The facts regarding the size of the orebodies are these, officially. The main stope on vein No. 2 as opened up at the 400 ft. level which is the more highly developed part of the mine is 350 feet in length, has an average width of eleven feet, and contains gold values which average $28.37 to the ton. In this one stope there are 18,702 tons of "broken" ore on which all mining charges have been paid and with no deferred charges entered up against it. This broken tonnage is sufficient to keep the present mill operating at full capacity for a whole year without striking another blow in the mine. Such is not the intention of the management, however, in that further development work is proceeding space and the ore coming from development alone is adequate to keep the mill running at full blast. This means that the ore already broken and that being blocked out is being stored up as a tremendous reserve which will eventually assure the operation of a greatly enlarged milling plant at such time as the company decides the mine has been developed to the desired point.

Indeed, there is no record of a similar achievement in the history of gold mining in Ontario where a property, equipped with a little 60-ton mill has been able to not only finance the expensive work of developing big ore reserves and the construction of a larger mill but to concurrently pay at least a moderate rate of interest on the par value of the shares. "The Lake Shore is only a baby, as yet," said an official to the writer,

"toddling along in its infancy." But, as commented upon by one who had just concluded a trip underground: "It's some baby, though."

Further, as regards the size of the orebodies, it has been learned by the writer from observation that No. 1 vein at the 600-ft. level where recently opened up is equally as wide and equally as rich as found in the main stope on vein No. 2 at the 400-ft. level. Furthermore, a second important stope is being opened up which is intended to be at least 300 feet in length and to be a close rival to the main stope above mentioned.

Regarding the Per Ton Cost.

In connection with the per ton cost of operations at the Lake Shore, considerable discussion is heard and, coupled with street remarks about the great riches of the mine, is to be heard the comment: "—But, take a look at the costs."

To those who are keeping mining operations under close observation, no comment and the meaning it implies could be more unjustified than in the case of the Lake Shore. In this respect, the facts are these: The company is employing a force of from 85 to 100 men and is developing the property on an extensive scale. The number of men employed is entirely out of proportion to the small daily tonnage which the little mill is able to treat and the aggregate cost of work is necessarily great for the reason that only a fraction of the expense incurred is in connection with supplying ore for the mill while the great bulk of work is for the purpose of providing big reserves with which to feed a big mill in the future. In a word, a large amount of energy and expense looking to future great revenue is being incurred, and the whole thing is being carried by the present little mill. It is all being charged against the small tonnage being treated so that no stored-up charges will lie against future production. For these reasons it is a marvel that this total current expenditure does not amount to a great deal more than an average of around $14 or $15 a ton on the ore being treated. Once this daily tonnage is increased, the per ton costs will automatically decline to a very low figure.

The physical condition of the property is exceedingly good, and the ore has an average per-ton gold content greater than any other gold-producing mine in Canada. The management is highly efficient and compares favorably with the best in the country, while the Company's policy is conservative and sound.

PERSONALS

Mr. F. L. Culver, president of Kirkland Gold Mines, is visiting the company's mine at Kirkland Lake.

Mr. H. G. Latilla, of London, is visiting the properties of Kirkland Lake Proprietary, Ltd.

Mr. R. P. Rogers, who was for some years manager of Coniagas Mines, Ltd., is visiting northern mining districts.

Mr. J. M. Dunwoody of the firm of Stroyan Dunwoody Co. of Winnipeg was in Toronto the past week arranging for the opening of a branch office to cover, particularly, the northern mining districts. This firm represents the well known English firm of Craven & Speeding Bros. of Sunderland, who specialize in the manufacture of steel cable particularly adaptable to the mining industry. It is the intention of this company to place in the Toronto office a man of wide experience in steel cable manufacture to take care of the business in the North.

TORONTO MINING STOCK QUOTATIONS.

Quotations on Active Stocks on Standard Stock Exchange for Week Ending May 21st 1921.

Silver	High	Low	Last.
Adanac Silver Mines, Ltd.	1.2	1	1 1/8
Bailey	3	2 7/8	3
Beaver Consolidated	33	32	33
Chambers-Ferland	5	5	5
Coniagas	1.70	1.70	1.70
Crown Reserve	15	11	15
Gifford	3/4	3/4	3/4
La Rose	23 1/2	20 1/4	20 1/4
Mining Corp. of Can.	1.20	1.08	1.08
Nipissing	5.20	5.05	5.10
Ophir	1 1/4	1 1/8	1 1/8
Peterson Lake	6 1/4	6 1/4	6 1/4
Silver Leaf	2	1 1/4	1 1/4
Temiskaming	20	17 1/2	20
Trethewey	17	15	16 3/4
Gold.			
Apex	2	1 3/4	2
Atlas	21 1/2	18 1/2	21
Dome Extension	70	70	70
Dome Lake	6	4	5
Dome Mines	22.50	21.00	21.75
Gold Reef	3 3/8	3 1/4	3 1/4
Hollinger Cons	7.35	7.23	7.35
Inspiration	5	4	5
Keora	15 1/4	12 1/2	14 1/2
Kirkland Lake	51	47	48 1/2
Lake Shore M. Ltd	1.32	1.28	1.31
McIntyre	2.05	1.97	1.99
Moneta	12	12	12
Newray Mines, Ltd	7 1/2	5	5
Porcupine Crown	27	24	24
Porcupine Imperial	1	1	1
Porcupine V.N.T.	22 1/2	19 3/4	22
Preston East Dome	3 1/2	3 1/2	3 1/2
Schumacher	25	23	25
Teck-Hughes	16 1/2	15 1/2	16
West Dome	8 7/8	8 1/4	8 1/2
West Tree Mines Ltd	4 3/4	3 3/4	4 1/2
Oils.			
Ajax Oil	10	10	10
Petrol Oil	25	19	24
Rockwood Oil, Gas	1 1/2	1 1/2	1 1/2
Vacuum G.	7	6 1/2	6 3/4

MONTREAL METAL QUOTATIONS.

Following the fair average prices for ingot metals (in less than car-loads) at Montreal:

	May 18	May 26
Copper, Electric	17 1/2	18 1/4
Copper, Casting	17 1/4	18
Tin	40	40 1/4
Lead	7	7 1/4
Zinc	8	7 1/4
Aluminium	33	34
Antimony	7 1/2	7 1/2

Mr. W. A. Donahue has been appointed mining recorder at South Porcupine, succeeding Mr. G. H. Gauthier.

Mr. R. Enns, manager of McIntyre Porcupine Mines, Ltd., is in Toronto for a few days.

BRITISH COLUMBIA LETTER.

The Metal Mines.

It was to be expected that, with the discovery of oil in the Mackenzie River Basin just outside British Columbia, there would be reports of promising indications in the same or adjacent latitudes in this Province. This observation does not refer to the Peace River Country prospects, for they have been before the Government for some years and exploration was underway before the Fort Norman excitement took place. It does apply, however, to the word of oil found near Burns Lake, on the Grand Trunk Pacific Ry., and to news of important finds both of oil and coal in the Coal River region, which river empties into the Liard River in the far north of British Columbia. Of the two latter nothing official nor definite, is yet known but they are to be investigated. J. D. Galloway, resident Government mining engineer, no doubt will visit the Burns Lake section during the Summer and his findings, together with those of other competent engineers expected to make an inspection, will be awaited with interest. The Coal Creek area probably will be inspected by George Clothier, government mining engineer, before the close of the season.

Prince Rupert, B.C.—While on the surface things may appear to be quiet there is a gradual and steady development of the Portland Canal area, according to D. B. Morkill. The immediate future he explained depended on the price of silver to a large extent and he was confident that it would go to eighty or ninety cents before long. The Premier Mine, he said, would be a bigger proposition that most expected. Last season, he stated, a million dollars worth of ore was shipped by sleigh. This was not a silver mine primarily. Mr. Morkill said but was a gold mine, although the ore contained high silver values. Because of the shortness of the season in the district development necessarily was slow but he thought that it might be confidently anticipated that, in time, other Premier Mines would be proven. This year the Leckie and Tubman and other prospects would be opened up on the Bear River. The Redcliff Mine also had been sold and would be developed. What was wanted, he declared, was not a boom but sonnd and steady development. He urged the people of Prince Rupert to work to that end and commended the forthcoming excursion to the district of businessmen of Victoria and Vancouver as a move likely to redound to the advantage of the Province, as it would tend to the education of the visitors as to the resources, the possibilities and the objects of mining men and other residents of the outlying northern sections of the country.

Alice Arm, B.C.—There is more activity in the Illiance River Valley than in any other section of this district at present. Some development work is being done on the Bellevue Group and the Silver Star. A number of claims also are being opened up by A. J. Bowen, former smelter superintendent at Anyox. In the Kitsault Valley there is no work in progress at present, the Dolly Varden being idle with no information as to what the plans are for the forthcoming season. A. J. T. Taylor, who has returned from the Old Country, has not yet made a statement on this point. He states that much depends on the silver market, which of course is not very enlightening, but it is understood that it is planned opening up on a small scale at any rate and probably doing some development work. The La Rose Group on the Illiance undoubtedly will receive further attention during the summer.

Trail, B.C.—Ore receipts in gross tons at the smelter of the Canadian Consolidated Mining and Smelting for the week, May 1st to 7th, aggregated 9583, bringing the total for the year up to date to 149,399 tons. Of the former figure the mines of the company contributed 9,583 tons and the Sally, of Beaverdell, 33 tons.

Slocan City.—It is predicted that the new concentrator which is being constructed at the Ottawa Mine, Springer Creek above Slocan City, will be turning out its first concentrates in a little over a month's time. The plant was designed by L. H. Biggar, who is superintending the installation. There is enough mill feed on the dump to keep the mill busy for two years and, while this material is being used, development work will be prosecuted.

Fort Steele, B.C.—Hydraulicking operations are being started on Wild Norse Creek by the Gamble Mining Company. At the outset some trouble was experienced with the pipe line but as soon as repairs are made work will be resumed and a successful season is anticipated.

Victoria, B.C.—William Fernie, 84 years old, pioneer prospector, mine operator, and railway promoter, died in Victoria on May 15th last. The City of Fernie, B.C. was named after him and he was the original discoverer of coal in that district. His first work as a mining man was done in the Australian mines of Bendigo and Perdue. Coming to British Columbia in 1860 he located in the Cariboo where he was engaged in mining for many years. In 1873 he was appointed Gold Commissioner for Canada which position he held for four years. On resigning he joined Col. C. Baker and other western Canadians in the effort to obtain a charter for the British Columbia Southern Ry. In this he and his confrères were successful and in 1887 Mr. Fernie located the coal fields of the Crow's Nest Pass. With the opening of these fields there grew up in that locality the now flourishing community of Fernie, which, as stated, was so named in honour of the man primarily responsible for its existenece.

THE COLLIERIES.

What is to be the result of the Coal Inquiry held by Commission on authority of the Provincial Government? Commissioner Henderson and his associates have reported and the chief point of their findings is that a combination of Vancouver City Coal Dealers has existed, that consequently competition has been stifled, and coal maintained at a uniform price among all those engaged in its distribution. Is the report to be followed by a material reduction in retail prices? It is hardly likely and yet the public is looking for such a development.

One outcome is the announcement by the Hon. J. W. de B. Farris, Attorney General, that consideration is being given to the question of those who have been guilty of the offence of joining in a "combine" in restraint of trade. This statement was made shortly after the Commission's Report was made public. Nothing further has happened since except that the Vancouver Coal Dealers' Association has held a meeting at which the organization was formally dissolved. But it is questionable whether this will lead to cheaper coal because, to use the words of W. C. Kirk, one of the members of the

now defunct association, "coal now is being sold for $14.00 and it can't be sold any cheaper unless the collieries reduce their prices."

A suggestion made by Commissioner Henderson that has met with much favourable comment is that a round-table conference be arranged between representatives of the operators, the dealers, and the public at which all questions regarding coal production, coal distribution, and coal consumption should be discussed. The Commissioner's idea is that thus all concerned would be enabled to obtain an intimate knowledge of the problems of the industry and by co-operation and understanding it might be possible to formulate plans that would result in more economical production, less duplication in distribution, more intelligent buying on the part of the public, and, consequently, the introduction of more satisfactory conditions generally, together, perhaps, with somewhat reduced costs all round.

R. R. Wilson, superintendent and resident manager of the Granby Consolidated Mining & Smelting Co's Collieries at Cassidy, Vancouver Island, for the past two and a half years has resigned and on the 1st of June next the duties of his office will be assumed by Charles Campbell, one of the company's well-known officials, he having been for 21 years superintendent and resident manager at Phoenix where operations ceased some time ago. Mr. Wilson is a son of W. R. Wilson, president and general manager of the Crow's Nest Pass Coal Company. He took charge at Cassidy before the industry was on its feet, completed the construction started by the Taylor Engineering Company, built up an efficient and smooth running organization that carried production from 100 tons a day in 1919 to 1200 tons a day in 1920. This was done in a virgin field and without extraction of pillar coal. It is authoritatively reported that it now is possible, should trade conditions warrant it, to increase the daily output to 1500 tons without difficulty.

Coal production for the month of April in British Columbia stands at about the same figure as that of March. In the Vancouver Island fields the output for March was 134,837 tons while for last month it was 135,669 tons, an increase of 832 tons. It will be seen, therefore, that there has been little change in conditions, supply and demand apparently have not materially altered. The most notable increase is in the Nicola Princeton Field, where the production of the Middlesboro Collieries, the Fleming Coal Co., and the Coalmont Coal Company have all risen, the total jump being 2,093 tons. In the Crow's Nest Pass there has been a decline of 8,678 tons, the figures being 68,739 as against 60,061 tons.

Following are the detailed statistics of output for the month of April:

BRITISH COLUMBIA APRIL COAL OUTPUT

Vancouver Island Collieries

Mine	Tons
Canadian Western Fuel Co.	39,773
Canadian Collieries (D) Ltd.	
Comox	40,336
South Wellington	7,756
Extension	17,512
Pacific Coast Coal Mines	Nil
Nanoose Wellington Coal Co., Nanoose	2,792
Granby Colliery, Cassidy	26,584
Old Wellington (King & Foster)	916
Total	135,669

Nicola-Princeton District.

Middlesboro Collieries, Middlesboro	5,133
Fleming Coal Co., Merritt	2,507
Princeton Colliery, Princeton	Nil
Coalmont Collieries, Coalmont	6,278
Total	13,918

Crow's Nest Pass District.

Crow's Nest Pass Co.	
Coal Creek	32,979
Michel	20,818
Corbin Coal & Coke Co., Corbin	6,264
Total	60,961
Total for month	309,648

The exploitation and the safeguarding of foreign markets for Canadian coal, and the preparation of coal produced in Canada for the domestic market, were subjects discussed in an interesting manner by Arthur V. White, consulting engineer of the Commission of Conservation of Canada, in an interview given recently in British Columbia. He said:

"There should be a strict, yet reasonable inspection and grading of coal both for foreign export and for home consumption. The United States gained great advantage in capturing foreign coal markets due to the exigencies of the war. The American coal operators, however later found that some of these captured markets were reverting to British and other coal operators because the European buyer found that he could not, in many cases, rely upon the uniform commercial integrity of the imported coal.

"Consider, for example the case of Denmark. According to official statements, Danish importers of coal have found it necessary to complain regarding breach of contract.

"'It happens too often,' says one authority, 'that shipments have a considerable short weight or that the coal shipped is of a quality inferior to that contracted for, or in case of an upward market, that the coal contracted for is not shipped at all, or only at a price that is higher than the contract price.'

"The United States is now seeking in an increasing measure to hold her export of coal trade by supplying 'inspected' coal definitely and satisfactorily graded with respect to quality.

"The Danish officials expressed the belief that such objectionable commercial features as have just been mentioned were due, in part at least, to the fact that neither the exporter nor the importer had the necessary first hand knowledge of each other, a knowledge which can best be obtained by personal contact and the establishment of mutual understanding and confidence.

Mr. White highly commended the efforts being made on the part of the Alberta Government and operators in now reaching out to secure an increasing portion of the Canadian and other markets, and to have the various coals of the province properly graded so that the purchases might rely upon the commercial integrity of his purchases. "Some coals", said Mr. White, "should not be shipped at all. In the case of South African coal, the government will not permit the poorer grades of coal to be shipped out of the country under any conditions.

"The United States Federal government has just been requested by its bureau of mines to make an ap-

propriation of $725,000 in order to establish a fuel inspection system for the purpose of giving to consumers and to producers of coal accurate information respecting the quality of coal purchased for domestic and industrial uses and for foreign commerce.

"The proposed measure seeks that authority should be granted for the establishment of a fuel inspection system as would provide coal-sampling equipments at such points as may be deemed desirable, procuring by lease, purchase, condemnation or donation the land or equipment necessary therefor; and to utilize those agents or agencies for obtaining representative fuel samples and to make such rules and regulations as may be necessary to accomplish this purpose."

"Shipment of British Columbia coal was recently made to Sweden", concluded Mr. White. "How infinitely better is it to have foreign shipments of our coal in all respects suited for the markets to which they are despatched than it would be to possess the opportunity to enter a foreign market and subsequently have it closed and barred against us because of failure to make the best use of opportunities and resources."

CHANGES IN CONSTRUCTION OF HARDINGE CONICAL MILL.

When the Hardinge Conical Mill was first introduced, it was felt that the very highest point had been reached in the development of a grinding mill. Likewise, down through the ages, it has been thought that some new invention was the last word in improvement. The Hardinge Company engineers, can, therefore, be pardoned for having felt the same way with respect to the Conical Mill.

Mechanically, however, the mill had been improved from year to year until, from the operator's viewpoint, it was mechanically perfect. The main bearings were ball and socket and self-aligning, thereby eliminating friction and reducing power-consumption to a minimum; the lining was built of the very finest material and daily established records for a long life and low consumption per ton of material ground. New types of feeding devices for wet and dry work had been invited and improved until the matter of feeding the mill, under all conditions, was very satisfactorily taken care of. The shape of the mill eliminated all grates and complications, resulting in a simple and fool-proof machine. The mechanical improvements upon the mill brought it to such a development that one man stated: "I worked nine years in that plant before I ever knew they had a Hardinge Mill."

Then there came a development in the method of grinding which revolutionized the field. Engineers found that no grinding machine had ever reached its ultimate capacity; that the capacity was not limited by what it would grind ultimately by rushing the material through and separating out whatever small percentage was finished after the one passage and returning the oversize, or reject, back to the mill for further grinding. This oversize has been termed "circulation load," In other words, the capacity of any mill was limited only by the amount of material which could be rushed through it rapidly enough to build up an enormous circulating load and not by the amount of grinding done in one passage through the machine.

The Hardinge Mill with its conical shape gave a much faster passage to the material going through the mill than any other type of machine, but still it was not fast enough to satisfy the Hardinge Company engineers, nor to answer for the theoretically perfect operation of a ball mill. Consequently, these engineers have re-designed the Hardinge Mill so that a maximum capacity is now attainable. They could not change the shape, because it had proven itself to be the best after long years of experience and grinding in the field under operating conditions. They could not improve the mechanical design which the years of operation had gradually perfected. Therefore, they improved the mill by faciliating the easy flow of material into the mill and out again.

The main bearings were set back upon the feed and discharge cones, shortening the entire length of the mill between centers of bearings, and the diameter of these bearings was greatly increased. The inside diameter of the trunnions was increased to such an extent that unlimited quantities of material could be fed to and discharged from the mill, thereby increasing its capacity to an approximation of the theoretically perfect capacity for a ball or pebble mill. By an ingenious device, arrangement has been made for raising and lowering the ball charge in the mill without affecting in any way the construction of the mill, or causing the grinding mediums to discharge with the ground material.

For dry grinding, where hot materials had to be fed into the mill, provision was made in the bearings for water-cooling them.

The result is that the Hardinge Mill is still the Hardinge Conical Mill, but materially improved in design, construction and operating efficiency and capable of giving much greater capacity for dry or wet grinding.

The many operators of Hardinge Mills, who have long advocated increasing the interior diameter of the feed and discharge trunnions, will appreciate the advantages of these improvements and will realize that the new Hardinge Mill will set new records in the entire field of grinding, even surpassing those formerly set by itself.

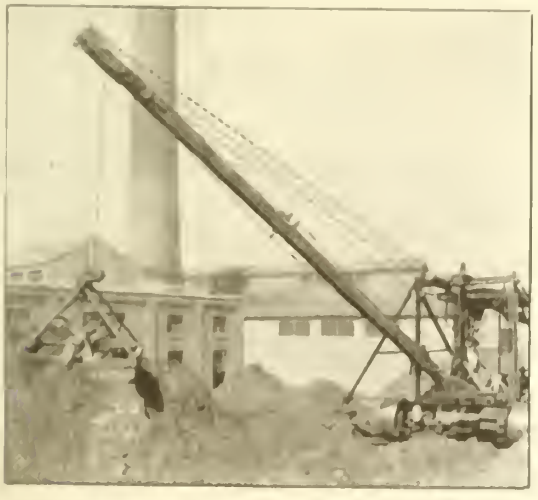
AS OTHERS SEE US.

A Quebec newspaper commenting on the possibility that some of the British coal mines may be ruined by flooding if the pumpmen do not return to their work, has the following remarkable information regarding mines in Pictou County, Nova Scotia.

"Pits where fire had developed in coal mines in Nova Scotia have been flooded to save unmined coal and have taken years to pump out. A still unexplained accident led to a series of most disastrous explosions of fire damp (the marsh gas of mines mixed with air) in the Foord Pit of the Albion Mines in Nova Scotia in 1882, and upwards of a hundred lives were lost. That was then the deepest coal pit in the world. The only way to control a fire of the magnitude of that which became apparent was to flood the mine. Stopping the pumps was insufficient and a channel was cut from the strait of Northumberland to an old pit connecting with the Foord, and the full strength of the Atlantic Ocean turned into the mine, destroying millions of dollars worth of property. Some of the most powerful pumps known to science have been working day and night for nearly forty years and the lower levels have not yet been uncovered nor any of the missing found."

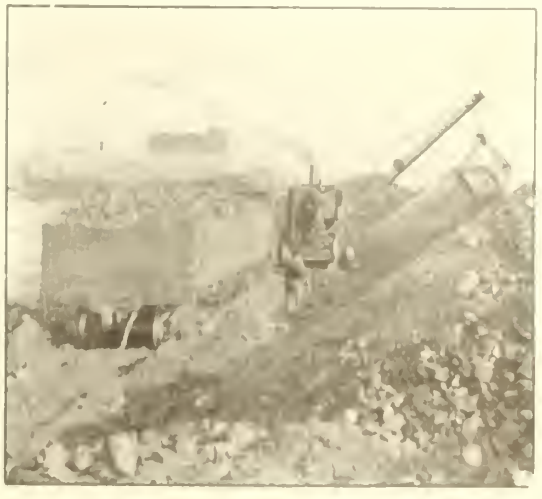
A COAL-HANDLING CRANE.

Steam shovels, with dipping buckets have been extensively used in stripping operations in surface coal-mining, or in reclaiming large storage banks of coal laid down on the ground, but the steam-shovel is a very expensive machine and lacks mobility. It is therefore unsuited to handling coal to and from stockpiles and cars in the manner often required in gas-plants, power companies, factories and works.



Steel crane coal from stockpile to hopper, making own track over piled coal

The auto-crane is a device designed to facilitate coal-handling in operations where expensive permanent coal-handling and transporting bridges are inadmissible, and where steam shovels are unsuited. The auto-crane, as may be seen from the accompanying illustrations is a very adaptable contrivance, possessing maximum mobility, ability to operate in cramped spaces and amid permanent or moving obstacles, and upon uneven ground. While adapted to ordinary contractors' uses, it is particularly useful, and primarily designed for coal-handling, it being virtually a portable unloading tower. The Canadian Sales Agents are Mussens, Limited, of Montreal, who are prepared to



Loading railway cars from stockpile

quote on a varied specification to suit varied uses. For instance, the auto-crane can be fitted for road traffic, to any rail gauge with railroad trucks, or with caterpillar treads, and the boom can be supplied to special lengths

PROVINCE OF QUEBEC

MINES BRANCH

Department of Colonization, Mines and Fisheries

The chief minerals of the Province of Quebec are Asbestos, Chromite, Copper, Iron, Gold, Molybdenite, Phosphate, Mica, Graphite, Ornamental and Building Stone, Clays, etc.

The Mining Law gives absolute security of Title and is very favourable to the Prospector.

MINERS' CERTIFICATES. First of all, obtain a miner's certificate, from the Department in Quebec or from the nearest agent. The price of this certificate is $10.00, and it is valid until the first of January following. This certificate gives the right to prospect on public lands and on private lands, on which the mineral rights belong to the Crown.

The holder of the certificate may stake mining claims to the extent of 200 acres.

WORKING CONDITIONS. During the first six months following the staking of the claim, work on it must be performed to the extent of at least twenty-five days of eight hours.

SIX MONTHS AFTER STAKING. At the expiration of six months from the date of the staking, the prospector, to retain his rights, must take out a mining license.

MINING LICENSE. The mining license may cover 40 to 200 acres in unsurveyed territory. The price of this license is Fifty Cents an acre per year, and a fee of $10.00 on issue. It is valid for one year and is renewable on the same terms, on producing an affidavit that during the year work has been performed to the extent of at least twenty-five days labour on each forty acres.

MINING CONCESSION. Notwithstanding the above, a mining concession may be acquired at any time at the rate of $5 an acre for SUPERIOR METALS, and $3 an acre for INFERIOR MINERALS

The attention of prospectors is specially called to the territory in the North-Western part of the Province of Quebec, north of the height of land, where important mineralized belts are known to exist.

PROVINCIAL LABORATORY. Special arrangements have been made with POLYTECHNIC SCHOOL of LAVAL UNIVERSITY, 228 ST. DENIS STREET, MONTREAL, for the determination, assays and analysis of minerals at very reduced rates for the benefit of miners and prospectors in the Province of Quebec. The well equipped laboratories of this institution and its trained chemists ensure results of undounted integrity and reliability.

The Bureau of Mines at Quebec will give all the information desired in connection with the mines and mineral resources of the Province, on application addressed to

HONOURABLE J. E. PERRAULT,
MINISTER OF COLONIZATION, MINES AND FISHERIES, QUEBEC.

BRITISH COLUMBIA

The Mineral Province of Western Canada

Has produced Minerals valued as follows: Placer Gold, $75,722,603; Lode Gold, $100,272,431; Silver, $50,432,304; Lead, $43,821,106; Copper, $153,680,965; Zinc, $16,818,487; Coal and Coke, $199,123,323. Building Stone, Brick, Cement, etc., $29,991,757; Miscellaneous Minerals, $786,918; making its mineral production to the end of 1919 show an

Aggregate Value of $670,649,894

The substantial progress of the Mining Industry of this Province is strikingly exhibited in the following figures, which show the value of production for successive five-year periods: For all years to 1895, inclusive $94,547,241; for five years, 1896-1900, $57,605,967; for five years, 1901-1905, $96,509,968; for five years, 1906 1910, $125,534,474; for five years, 1911-1915, $142,072,603; for the year 1916, $42,290,462; for the year 1917, $37,010,392; for the year 1918, $41,782,474; for the year 1919, $33,296,313.

Production During last ten years, $322,829,310

Lode-mining has only been in progress for about twenty-five years, and not 20 per cent. of the Province has been even prospected; 300,000 square miles of unexplored mineral bearing land are open for prospecting.

The Mining Laws of this Province are more liberal and the fees lower than those of any other Province in the Dominion, or any Colony in the British Empire.

Mineral locations are granted to discoverers for nominal fees.

Absolute Titles are obtained by developing such properties, the security of which is guaranteed by Crown Grants.

Full information, together with Mining Reports and Maps, may be obtained gratis by addressing

THE HON. THE MINISTER OF MINES
VICTORIA, British Columbia

EDITORIAL

The Unfairness of Measuring Canada by the Industrial Standards of the United States

There is a school of thought in Canada which everlastingly measures the industrial achievements of our country against the standards of the United States, more particularly the standard of cost of production. If it should be that industries in Canada prove unable to produce materials at as low a cost or, in as large a quantity as similar materials are produced in the United States, it is argued that the Canadian effort must stand self-confessed as a failure without excuse for existence or efforts toward persistence. It is a doctrine as melancholy as it is fallacious. Its inherent falseness resides in the assumption, usually an unconscious one of course, that, in some occult and unexplained manner, Canada is part of the United States sphere of influence. Any visible basis there may be for this belief has come about as a result of pitting the industrial performance of Canada against those of the United States without admitting that in many respects the United States is strong where Canada is weak, and without admitting the further fact that the strength of the United States and the weakness of Canada is a result of a deliberate choice of the Canadian people.

The attitude of the purchasing departments of the Federal Government, and of the large railways, is to base comparisons of quotations received, for materials required, upon United States bases. Similarly, Canadian manufacturers have learned to make their quotations upon a United States base figure, plus the additional charges accruing to the point of delivery in Canada. Why this everlasting reference to a Pittsburg or New York quotation? One explanation is that Canadian government departments have not yet learned to look to Canada as the only legitimate place to place government orders for articles that Canada can produce, and behind all their actions is the threat (all too often translated into actuality) to buy goods outside Canada, if it should be suspected, or assumed, that the Canadian price is not as low as it should be, measured by United States standards.

This relentless comparison, so far as many tariff created Canadian industries is concerned, is equivalent to raising a boy to delicate ways and then pitting him against a trained pugilist. The exotic flower will not, and what is more, it cannot, by reason of its mode of growth, be expected to live if turned out into the frost of winter.

There are a number of basic Canadian industries which cannot compete on even terms with the corresponding industries in the United States, because they lack the essential raw materials, the market and the availability of labour, conditions which the United States can supply in superabundance. This impossibility of even competition has been seen and acknowledged by our legislators, and they have passed restrictive laws intended to correct the unevenness of competitive ability and enable certain necessary "key" industries to exist in Canada. The reasons for this policy were not originally, and are not now, economic. These reasons were primarily national. The policy was not intended to enrich Canadian individuals, nor has it done so to any remarkable extent, but it was adopted to make possible the existence and persistence of Canadian national self-government and fiscal independence. Viewed from the standpoint of those who see in North America only one territorial unit, the policy was quite possibly one that violates economic laws, but North America is not one territorial unit, but two, and, if it comes to a choice between dearness of materials and abnegation of national independence, we must even put up with the high cost of living.

It is the national habit of comparison with the United States that so inhibits Canadian enterprise as to render this country incapable, to a larger extent that is really necessary, of utilising the things it does possess. If the earthen jug goes too often to the well with the iron vessel the inevitable result is proverbial, but it will be hurried if collision is deliberately sought after, and this seems to be a favorite pastime of our legislators.

The first requisite to a fair viewpoint on the ability of Canada to achieve some measure of industrial power is an admission that our raw materials, in some of their most important instances, are relatively small in extent and expensive to work. This admission does not depreciate Canada's assets, for their extent is not altered by

opinion, but, unless our legislators and the public are given some correction of the exaggerated notions they possess in regard to resources of raw materials in Canada, they will continue to expect the impossible, will continue to damn as incompetency all Canadian failures to reach United States performances, and risk the destruction of Canadian enterprises through sheer misconception of this country's abilities and resources.

One thing a good Canadian citizen will do, if he is a true patriot, is to accept Canadian limitations as a condition urging him to make the best of what we have. He feels it is incumbent upon him to help to make up by personal endeavour for this country's comparative poverty in certain particulars. Such citizens deserve Canada's thanks, but all too often they receive opprobium not because of lack of success, as success should be measured, but because they do not produce as cheaply, or in such prodigality, as is done in the United States. It is dangerous, because of the liability of being misunderstood, for anyone in Canada to maintain that certain things *cannot* be made as cheaply in this country as elsewhere, but it is certainly more honest, and it certainly will lead to greater real progress and permanence in our industries if the public understands the inherent limitations Canada suffers under and is prepared to pay the price that industrial independence under such circumstances calls for.

Canada is more than a place of residence, a place to cash cheques and to receive goods that must be paid for. It is a country that possesses much natural wealth, a little inferior in quality, and a little less in quantity, in some regards, than that of our southern neighbour, but infinitely less developed. The development of our neighbour's estate has been helped by neglect of our own estate, and cheapness is the excuse perpetually given for such disastrous national procedure.

Cheapness is the privilege of a trader, but in some of the most essential things Canada has long since lost her right to be classed as a trader, and has become a suppliant—a beggar. A country that deliberately relinquishes its ability to produce and undertakes to buy instead, puts itself in the position of a man who prefers to rent a house to buying it, although quite able to buy. He takes the risk of being turned out, and scant sympathy he deserves or gets, when the choice is his own.

THE DRAWBACK OF INCOMPLETE MINE-COST DATA.

The April Bulletin of the Institution of Mining & Metallurgy contains a paper by A. E. Petit on "Notes and Records of Mining Costs" together with a transcript of the discussion thereon, that directs attention to a much misunderstood matter. Mine-cost accounting is of course capable of just as accurate and scientific treatment as any other technical department of the mining industry, but it has rarely received it.

Alexander Richardson, in the contributed discussion, remarks: "One grave objection to the publication of incomplete cost data is that the uninformed are led to suppose that the mine is doing far better than it really is, and, therefore is well able to support further heavy financial burdens. Another is that the absence of a standard system of mine accounting precludes the drawing of informative comparisons between mine and mine, and district and district."

This opinion is commended to the members of the parliamentary committee on future fuel supplies now sitting at Ottawa, and it may also be commended to the careful attention of mining executives generally. The use of incomplete and partial cost-sheets is being visited at this time with the inevitable reward of inaccuracy and incompleteness. Much undeserved onus, great financial saving, and more reasonable treatment of the industry would have attended mining had mine-cost accounting been given the attention it deserves, and had mine-cost sheets been what they purported to be, and not merely the addition of out-of-pocket expenses for labour and material expended.

Mr. Richardson points out in his remarks, which refer more particularly to the Rand gold-mining industry, that the sum available for distribution as dividend is usually only sixty-five percent of the working profit. Why should mine executives deceive themselves, and pose to the world as being much richer than they really are, by persisting in a system of cost accounting that is so obviously incorrect?

The Fuel Committee at Ottawa has assumed that if it gets the monthly mine-cost sheets of the coal companies in Canada it will ascertain the cost of coal, but it will not. Probably the most competent witness that has appeared before that Committee is Mr. R. A. Ross, whose professional qualifications do not need enumerating here. Asked as to what he knew about the cost of coal Mr. Ross said he knew nothing, and asked further as to the cost of one horse-power generated from coal. Mr. Ross was unable to determine it, and knew no one who could. For once, the Fuel Committee obtained the precise truth. The Fuel Committee have been extremely anxious to initiate comparisons between the cost of coal in the United States and in Canada, but it will be long before they get that information, because no one either in the United States or in Canada has ever dared to attempt the calculation.

Mr. Britt, General Fuel Agent of the Canadian Pacific Railway, told the Fuel Committee that in 1912 and 1913, his Company bought Nova Scotia coal at $\$2.61\frac{1}{4}$ per net ton on cars at Montreal. If a competent accountant were to endeavour to ascertain what that coal cost the company that sold it he would find that the selling price was less than the real cost, and this is typical of the whole coal-mining industry of North America for many years past, and even today.

No industry knows so little about the cost of the product it sells than the mining industry, and the case of coal is only more obvious because it bulks so largely above all other products of the mine.

Mine-cost accounting has all too often been the province of accountants ignorant of all the factors that determine the profitable duration of production from a mine, or of mine executives ignorant of the principles of accounting, which are not simple. The really expert mine-cost accountant requires to have full knowledge of mining engineering and of accounts, and the combination is a rare one.

The remedy is largely in the hands of the mine executive. Until he reforms his methods of cost-accounting he will continue to be exposed to raids by uninformed tax-gatherers, attacks from self-educated economists representing labour interests, vexatious government investigations and control, and will continue to delude himself that his enterprise is profitable when probably it is not.

LIGHT RAILWAY WOULD HELP DEVELOPMENT

It is reported in Toronto newspapers that the men who propose building a light railway from Swastika, through Matachewan and Gowganda to Shiningtree are endeavoring to get some assistance from the Ontario Government. What measure of support the Government will give the project is as yet unknown; but in view of the nature of the enterprise and the aid it would be in developing three promising mining areas it is reasonable to expect that the Government will assist in some manner. It is to be hoped that substantial encouragement will be given those who undertake to provide the district with the much needed transportation facilities to make possible the beginning of the work of construction this summer. The development of Ontario mineral resources would be given a great impetus by the construction of the railway. At no time has the opportunity for speeding up development been so great as it is now. Gold mining can be made a much greater industry in a short time in Ontario if some definite assurance is given by the Government that it is ready to take some part in providing transportation.

The Ontario Government has been asked to extend the T. & N. O. Railway to mineral areas on either side of its main line. Evidently, however, it is not disposed to undertake such construction at the present time and there seems little chance of the prospectors and mine operators getting transportation facilities of this kind for some years. The next best project is the light railway which private enterprise will build if it gets a reasonable measure of Government assistance. This could be done by the purchase of a portion of the bonds which will be issued by the company. The Province would thus help in the development of the mineral areas without committing itself to large expenditure. Its share in the enterprise would be revenue-producing and secured by the property. The building of the railway would also relieve the Government from the necessity of building waggon roads in places where such roads are costly to build and unsatisfactory when completed.

Gold mining is looming up as one of most promising sources of production at a time when other Ontario business enterprises are experiencing hard times and when larger production of an easily saleable article would have a very marked effect in maintaining the credit of the Province. To encourage whose who would develop gold mines in Northern Ontario would be very wise policy. The results of vigorous development would be felt all over the Province.—R. E. H.

BRADLEY STOUGHTON RESIGNS A. I. M. M. E. SECRETARYSHIP.

Mr. Bradley Stoughton's retirement from the secretaryship of the American Institute of Mining and Mechanical Engineers will be very generally regretted by the members of the sister society in Canada. Mr. Stoughton has attended with great regularity the annual meetings of the Canadian Institute of Mining and Metallurgy, and what he had to say, although never dull and always mirthful, nevertheless conveyed a serious purpose and a stimulating thought. Mr. Stoughton was an ambassador of good fellowship and of international amity, and when he was in Canada he paid Canadians the compliment of one of them, and was always so regarded. The mining men of North America are not a numerous congregation, relatively speaking, but, so far as their influence extends to good understanding between our people and those of the United States, Mr. Stoughton's incumbency of the secretaryship, remarkable as it has been for the progress made by the A. I. M. M. E. itself, will be remembered for its international courtesies, and for Mr. Stoughton's quiet but firm repression of anything that savoured of discord, or of that attitude which William Archer in the "Atlantic" has recently named "The Great Stupidity."

Mr. Stoughton has the good wishes of the mining profession in Canada. His success in professional practice is assured, but nevertheless we wish him luck.

"DEAD MEN ON THE MINER'S CHEST."

The "Mining Journal" of London in regard to the British coal situation states that, speaking roughly, the number of workmen employed at the collieries has increased by 100,000 men, and the output has dropped 50 million tons per year. "It is asserted", says this London paper, "that over 600,000 more men have been employed on the surface since the war, and every mining engineer knows that a growing surface complement and a falling output are the surest signs of inefficiency." The main issue, states the "Mining Journal," is one of output which has fallen from something like 21 cwts per day before the war, to 15 cwts per day in 1920. In Britain as elsewhere, the miner at the face is carrying too many "dead men" on his back. There are too few miners and too many "datallers."

Spectacular Blast at the Trap-Rock Quarry of the Ontario Rock Co., Preveneau.

Specially Contributed to the "Canadian Mining Journal" by Mr. T. F. Sutherland, Chief Inspector of Mines for Ontario.

Mining operations of a spectacular nature and referred to as an "uplifting event" by the "Havelock Standard" were conducted by the Ontario Rock Company on April 29, when 26,000 cubic yards of rock were broken in one blast at their trap-rock quarry at Preveneau. Preveneau is three miles east of Havelock, in Belmont Township, East Peterborough, and on the Toronto-Ottawa branch of the Canadian Pacific Railway. In spite of the day, Friday, the "uplifting event" was a complete success. No damage was done to the plant and an overbreak was obtained. One of the power poles was broken off by a flying rock and the crossing of the high-tension wires added to the general effect and greatly increased the mental agonies of a few important but large gentlemen who had taken the precaution of placing a two-inch birch tree between themselves and the blast.

Officials of the Canadian Pacific Railway, the Dominion and provincial governments, and the city of Toronto, were in attendance, as well as a camera man for the Fox Film Company and a press photographer. When all was in readiness the switch was thrown by John A. Sexsmith, M.P. for East Peterborough. Geo. W. Rayner, vice-president and general manager of the company, had complete charge of the operations.

This quarry is the only trap-rock quarry at present operating in the province of Ontario and was found by geologists of the Ontario Bureau of Mines during their geological survey of this area in 1907 and 1908.* Shortly after the geological survey was completed several enquirers for quarry sites were directed by the Ontario Bureau of Mines to this locality, and work was finally begun by the Ontario Rock Company. The quarry industry here was thus developed directly as a result of the geological mapping of the area.

The rock is a dark-green type, generally too fine-grained to distinguish the constituent minerals without the aid of a microscope. Thin sections examined under the microscope show that the trap rock consists essentially of plagioclase feldspar, hornblende and magnetite. The feldspar is in places comparatively fresh. The chemical composition of the rock is shown by the following analysis:

Silica	45.20%
Ferrous Oxide	9.74
Ferric Oxide	8.37
Alumina	22.30
Calcium Oxide	8.02
Magnesia	1.51
Soda	2.59
Potash	0.46
Water of Crystallization	2.04
	100.25%

The physical properties are as follows:

Specific Gravity	3.05
Hardness	20.00
Toughness (impact test)	20.00
Abrasion	2.5
Cementation	39.00
Crushing Strength.	37,300 lbs. per sq. in.
Weight per cubic foot	181.78
Pore space, per cent	0.44
Ratio of absorption	0.14
Coefficient of Saturation, 1 hour	0.075
Coefficient of Saturation, 2 hours	0.087

The rock is shipped principally to the City of Toronto, the city engineers specifying trap rock for many features of pavement, sidewalk and curb construction. It is also used extensively by the York Highway

General View of Quarry and Crushing Plant of Ontario Rock Co., Preveneau, Ont

Ontario Rock Company's Prevenean Quarry, showing 60 foot face and entrances of Blasting Adits.

Commission and was used in the foundations of the new eighteen-storey addition to the King Edward Hotel. Many architects specify trap rock in all fire-proof buildings. The product is shipped in sizes ¼ in., ½ in., 1 in., 1½ in., 2 in., oversize, rubble and talus to any weight required.

Ten years ago, when the quarry was first operated, one No. 5 gyratory crusher only was in use. Now the primary crushing is done by a 15-inch by 60-inch Superior Jaw type crusher, which delivers the product

Showing some of the blocks (five ft. staff being used).

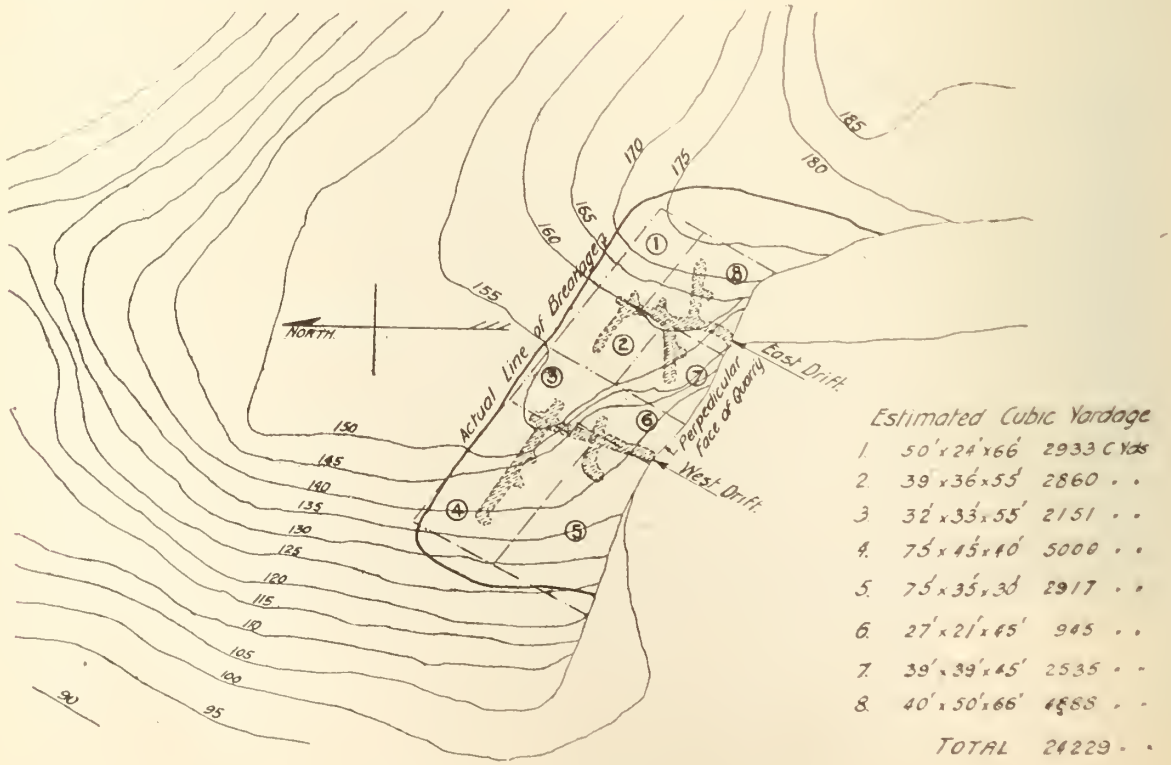
to a No. 8, two No. 6 and three No. 4 crushers which are operated in conjunction with 6-ft. and 4-ft. revolving screens.

One of the principal difficulties in the operation of this quarry has been the excessive cost of drilling and blasting, owing to the hardness and toughness of the trap rock; for example the original method of drilling was by 3¼-inch reciprocating drills; the complete daily footage obtained by these drills being under 20 feet. It was found impossible to drill holes deeper than 18 feet and a great deal of time was consumed in the springing and blasting. To obviate this, drills of the blast-hole well-drill type were introduced. At first an attempt was made to work these drills on a 75-foot face, but it was found that so many drill bits and stems were left in the holes, that there was no advantage in attempting to work a face greater than 30 feet. It was then decided that the quarry would be opened in two benches, so a face was opened up on a bench which at the present time has a face of about 40 feet, and an attempt was made to continue the drilling with blast hole drills. It was found that by drilling with blast-hole drills a good day's drilling would be about 7 feet, while a month's average would not be over 4 feet daily, so it was decided by the management to attempt to increase the output with one large blast.

In December, 1920, two adits were started, the westerly one being under 50 feet of back and the easterly one under 65 feet of back. The manner in which the adits were driven is shown in the accompanying plan. The west, or No. 1, adit was driven 60 feet north and cross-headings 60 feet west and 10 feet east. Three pockets were made in the south side of the west cross-heading as shown in the plan. At 30 feet from the portal, cross-headings were driven 20 feet to the southwest and 10 feet to the east. These headings were loaded with 180 cases of 60 per cent nitroglycerine dynamite, distributed in seven charges, and in each charge two No. 8 electric detonators were used. The detonators were connected in one series of six and one of eight.

Seventy feet easterly the No. 2, or east adit, was driven north 60 feet. Twenty-five feet from the portal a cross-heading was driven east 30 feet, and 30 feet from the portal a cross-heading was driven west 30 feet, and at the face of the adit a cross-heading was driven 30 feet to the west. These headings were loaded with 60 cases of 60 per cent nitro-glycerine dynamite and 120 cases of black powder divided into nine charges with two No. 8 detonators in each charge, connected in two series of nine each.

The charges were covered with oiled paper and then loaded with sand tightly packed. The adits were packed as tightly as possible with rocks, and at 30-foot intervals the face of the rock was covered with a foot of sand.



Plan of Quarry (see letter-press for details).

As the work was carried out, each fuse was tested with a galvanometer, and galvanometer tests were carried out all the way through. Two sets of lead wires were connected in parallel to two wires which carried the current from the Hydro-Electric power lines to the charges.

It will be noted that the method of computing the powder charge to be used was based on an estimate of the ground to be broken as shown in rectangles 1, 2, 3, 4, 5, 6, 7 and 8. In the case of rectangles 1, 2, 3, 4, 6, 8, the amount of powder per yard was estimated at about three-quarters of a pound. In the case of rectangles 5 and 7, less than a half-pound of powder was used to the yard. The reason that the lighter charge was used in these two cases was owing to the fact that in rectangle 5 the rock was pretty well broken and in the case of rectangle 7 there was only about 16 feet of toe on the two pockets.

It was estimated that the shot would break about 24,000 cubic yards and the actual yardage broken was about 26,000.

PERSONALS.

Dr. R. W. Brock, of Vancouver, who was for some years professor of geology at Queens University and later director of the Geological Survey, is visiting in the east. He is at present in Toronto.

Mr. Cyril W. Knight, Assistant Provincial Geologist, is at Cobalt, and will spend the summer there making an underground study of the silver mines.

Mr. J. B. Tyrell has returned to Toronto from Kirkland Lake.

Mr. D. A. Dunlap, vice-president and secretary of Hollinger Consolidated, has joined the board of directors of the Northern Light Railway Company.

Mr. Frank L. Culver, president, and Mr. R. P. Rogers, manager of northern Light Railway Co., have returned to Toronto after making a trip north.

Dr. M. E. Wadsworth, the organizer and for twelve years the president of the Michigan College of Mines, Houghton, died at his home in Pittsburgh on April 21.

Mr. J. R. Finlay has been retained to make an appraisal of the mines of New Mexico.

Mr. A. M. McQueen, of the Imperial Oil Co., is at Edmonton in connection with the company's exploration work in the Mackenzie River district.

Mr. F. L. Culver has returned to Toronto from Kirkland Lakes. Mr. Culver is well known in the north, being to a large extent responsible for the successful development of the Beaver silver mine and the Kirkland Lake gold mine. It is stated that he will be president of the Northern Light Railway Co., which should prove a big factor in developing new mining areas in Northern Ontario.

Lt.-Col. R. P. Rogers, who was for some years resident at Cobalt as manager of Coniagas Mines, Ltd., and who during the war was in charge of construction of light railways in France, is to superintend construction of the Northern Light Railway.

Mr. D. B. Dowling, of the Geological Survey, Department of Mines, is at Edmonton purchasing for an exploration trip down the Mackenzie River. Mr. Dowling has done many years geological field work in western coal and oil areas.

SAFETY OF COAL MINES DURING STRIKE PERIODS.

Bill Introduced into Nova Scotia Assembly Providing for Retention of Maintenance Forces to Prevent Flooding and other Things.

A Bill was recently introduced into the Nova Scotia Legislative Council by Hon. N. J. Gillis, of Glace Bay, intended to prevent damage to coal-mines by flooding and explosions during periods when coal areas are held out of operation by strikes or other reasons. Text of the Bill is as follows:

"Whenever it appears to the governor-in-council necessary for the preservation of the property and interest of the Crown in any mineral in any area or areas held under lease or leases, whether mining operations on said area or areas have ceased or not, that the workmen of any particular class designated or any of such workmen should perform the work they are then or have been performing in or about the mine or mines on such area or areas, the governor-in-council may issue a proclamation that such persons or any of them shall until further order perform or continue to perform the work they are or have been performing, and any person of the class so designated who fails or refuses to obey such proclamation shall be guilty of an offence against this act and shall be liable on summary conviction therefor to imprisonment for a term of not less than one nor more than four months, and any person who by any means whatsoever directly or indirectly persuades or procures or endeavors to persuade, prevail on or procure any such person to disobey such proclamation shall be guilty of an offence against this act, and shall be liable on summary conviction therefor to imprisonment for a term of not less than six nor more than nine months."

In introducing the Bill, Mr. Gillis stated the Dominion Coal Company, for every ton of coal produced from its mines, required to pump ten tons of water. The ownership of the coal areas by the people of Nova Scotia made it necessary to take precautions to prevent damage during periods of cessation of work. In one group of mines, Mr. Gillis stated he was reliably informed, abandonment for four or six weeks would involve an expenditure of a million dollars to recover the mines, and in certain of the mines referred to operations would probably never again be resumed.

The Bill was rejected by the Lower House.

NOTES FROM THE NOVA SCOTIA COLLIERIES.

Coal production during May was slightly speeded up towards the end of the month. The Dominion Coal Company expects to obtain 270,000 tons from the Cape Breton mines and 35,000 tons from the Springhill mines, which will compare with 175,000 tons from Cape Breton and 33,500 tons from Springhill during April.

Coal is moving up the St. Lawrence and between 1 and 1½ million tons should reach St. Lawrence points from Nova Scotia during the season of navigation. A little coal may go to oversea points if, as seems likely, the British coal strike is prolonged. It is, however, unlikely that full time operation of the coal mines will take place until resumption of steel making becomes possible, and this, in its turn is hardly possible until substantial reductions in the mining cost of coal has been found possible.

The Distribution of Coal-Mine Working Force.

(With Especial Reference to Coal Production in Nova Scotia.)

By the EDITOR.

The main economy sought for in coal-mining is increase of the individual unit of production, or, putting the matter in another way, production of a maximum output with a minimum number of workmen. It may be demurred that this is not a problem peculiar to coal mining, but it is especially of importance in coal-mining because only a portion of the working force is actually engaged in coal production. All the other men are engaged in handling the coal produced, so that the task of the colliery manager is primarily concerned with the actual dislodgement of coal from the coal-seam, and, no matter how elaborate the ventilating, pumping, haulage and screening equipment of a colliery may be, the actual success of that colliery as a producer of coal, cannot be greater than the capacity of the workers at the coal face.

Examination of such statistical literature as is available in public prints will disclose that, in all coal districts which have felt the drain of war enlistments, the number of faceworkers has dropped since pre-war times almost precisely in the ratio in which coal production has dropped. This general rule has one notable exception, namely, in the coal districts of the United States, which did not suffer any notable drain by war enlistments.

There is a very general impression abroad that the coal miner (that is the man who actually mines or loads at the working-face) has shown a lowered efficiency. This belief is not confirmed by study of the statistics. It is true that the production of coal per man employed at the collieries has declined, but this is entirely due to the altered ratio of coal miners and loaders to coal-handlers and surfacemen. It is not a question of the inefficiency of the working forces at the coal-mines, but it is a question entirely of the *inefficient arrangement* of the forces employed. The reasons for the existence and perpetuation of this inefficient arrangement it is not proposed to discuss, but it is merely desired here to disclose the fact of its existence.

A comparison of the distribution of the working forces at the collieries in Nova Scotia, based on the Mines Report Statistics for 1920, and the performances of 1915, before reduction of the working forces by enlistments, gives these figures, which are closely approximate, namely:

	1915	1920
Percentage to total employees borne by:		
Surfacemen	13%	20%
Underground Labour	42%	44%
Miners	45%	36%
	100%	100%
Production per man per day employed:		
Surfacemen	19 tons	11 tons
Underground Labour	6½ "	4½ "
Miners	6½ "	6½ "
All classes	2¾ "	2 "

The reduction in coal output, under same conditions of equipment and extraction conditions, has been approximately 30 per cent. The reduction in the total number of men employed has only been 20 per cent, which is the condition that is usually taken to indicate inefficiency among the mineworkers. The decrease in the number of actual miners is very close to forty per cent, which is the true index to conditions, and this condition discloses an *increase* in efficiency among the faceworkers. As an actual fact, the production of faceworkers during the years 1914 to 1920 inclusive, has varied only within the narrowest limits, to be precise, from 6.3 to 6.5 tons per miner per day. That is to say, it has really not varied at all.

In 1915 the Dominion Coal Company employed a maximum of 2,990 miners, who in the maximum month of July of that year produced 462,000 tons. In 1920, this Company, according to the statistics of the Mines Department (corrected) employed only 1,732 miners, a decrease of 1,258 men, or 43 per cent. The decrease in coal production was thirty per cent only, showing that the faceworkers in 1920 worked more efficiently as individuals than at the time of maximum production.

In view of these comparisons, it is difficult to understand why the individual reports of the Deputy Mine Inspectors should state in reference to specific collieries that a sufficient number of men were employed. The cause of the decline in coal production cannot, of course, be separated from a shortage of coal producers, and it is quite evident that until the Dominion Coal Company obtains 1,200 additional miners it cannot bring its output back to where it was in 1915. Precisely the same statement may be made of every other coal company in Nova Scotia, if the matter is viewed from the point of the number of coal producers without reference to the output capacity of the mines themselves.

This is a fact of major importance that the enquiry of the parliamentary fuel committee has not educed, for it is a condition that is not only at the base of decreased coal production but in large measure responsible for increased cost of production.

In 1915, in Nova Scotia, the percentage of non-productive day-paid workers was 55 per cent. In 1920 it was 64 per cent.

The men who mine coal and who make profitable operation of coal-mines possible by that fact, were in 1915 in the proportion of 45 per cent. In 1920 and now they do not exceed 36 per cent. These men are paid on contract rates for what they do.

If two thousand miners could be put to work in Nova Scotia collieries, an additional production of 160,000 tons a month, or say from 1¾ to 2 million tons per year of coal, is possible, and this without adding more than 10 per cent to the non-productive classes of mineworkers. In most cases no additional non-productive workmen would be required to handle the additional coal that would be produced.

The lowered production of coal in Nova Scotia is therefore attributable to shortage of faceworkers, and this shortage is a direct consequence of the war.

J. Austen Bancroft

From "Institute Notabilities" May Bulletin of C. I. M. & M.

DR. J. AUSTEN BANCROFT was born in Upper North Sydney, Cape Breton, N.S. Growing up under the very shadow of the collieries, and in a region of exceptional geological interest, it was only in the natural order of things that, at a very early age, his attention should have been attracted towards mining and geology. It very soon became apparent that his inclinations also turned that way, and this happy conjunction of environment and natural selection has resulted in the development of a very fine type of economic geologist.

Bancroft received his early education at Springhill High School. From there he entered Acadia University in 1899, and after four very successful years he obtained the degree of B.A., graduating with high honours and winning the gold medal for highest standing in his class. In the autumn of the same year (1903) he entered the senior year at Yale University, and obtained the degree of A.B. at the end of the college session. Being then awarded a Fellowship, he continued his studies at Yale for another year, and obtained the degree of A.M. in 1906.

About this time, Bancroft most fortunately began to feel home-sick. At least we find that in 1905 he accepted the position of Demonstrator in the Department of Geology at McGill University, and he has been a member of the staff continuously since that time. Rapid promotion led to his appointment as Dawson Professor of Geology in 1913. At McGill he has won for himself an enviable reputation, not only as a geologist with a thorough knowledge of his subject, but also as a teacher who possesses to an unusual degree the faculty of being able to impart his knowledge to others in a most interesting manner. While to most members of the Institute, Dr. Bancroft is probably best known for his work in the field as an economic geologist, there will be many readers of this BULLETIN, graduates and undergraduates of McGill, who cherish fond memories of their former Professor as a forceful and extremely lucid lecturer, and a most painstaking and patient demonstrator in the laboratory.

Dr. Bancroft has always made good use of his long summer vacations. A change is said to be as good as a rest. Sometimes his change has consisted in a metamorphosis from teacher to pupil, as when he spent the summers of 1908 and 1910 at the universities of Leipzig and Bonn, respectively. Such graduate studies led to his obtaining the degree of Ph.D. at McGill in 1910. For the most part, however, and continuously since 1910, he has devoted his summer vacations to geological investigations in the field, principally in the provinces of Quebec and British Columbia, with the exception of 1917, when he spent several months in British Guiana examining deposits of bauxite. Dr. Bancroft's reports dealing with the several geological investigations he carried out for the Bureau of Mines of the Province of Quebec are well known, and his report on the Copper Deposits of the Eastern Townships (published in 1914), is an especially comprehensive and valuable contribution to our knowledge of the copper resources of that region.

From the first, Dr. Bancroft's leanings have been toward the economic side of geology, and in recent years he has devoted his seasons in the field entirely to that branch of the subject. Two summers (1918-19) were spent in this way examining and reporting upon the copper deposits at Anyox, B.C. for the Granby Consolidated Mining and Smelting Company. That the Company appreciated the high standard and value of his work is evident from the fact that, early in the present year, they offered him the position of Assistant General Manager. This position, Dr Bancroft has accepted, and, for one year at least, McGill will lose his services; for, loath to let him go entirely, the University has granted him one year's leave of absence, in the hope that the prodigal may yet be persuaded to return.

It is almost superfluous, in this brief sketch, to add anything concerning Dr Bancroft's personality; he is so widely known among members of the Institute from coast to coast. For the benefit of the few who have yet to meet him, however, it may be said that he is a big man, both physically and mentally; a man whom it is more easy to follow than to keep pace with, whether it

DR. J. AUSTEN BANCROFT, F.R.S.C.

be in a 'hike' through the bush or the pursuit of life's major objectives. In a word, just as the hypothetical John Bull represents the ideal Englishman so the "J. B." of the present sketch embodies all the best characteristics of the Canadian.

Dr Bancroft was elected a Fellow of the Royal Society of Canada in 1920. He is also a Fellow of the Geological Society of America, and a member of the American Institute of Mining and Metallurgical Engineers. He became a member of the Institute in 1909 and served on the Council during the period 1911-1913. At the recent Annual Meeting he was again elected a Councillor, as one of the representatives for the Province of Quebec.

The Northern Light Railway Company.

A Project to Open up the Silver and Gold Districts lying Between Cobalt and Porcupine in Northern Ontario. Is Backed by Experienced Financiers and Operating Executives.

With practically all the preliminary details completed, including the organization of the company, the granting to it of a charter and the official sanction of the Ontario Government, the Northern Light Railway Company promises to be a tremendous factor in the further development of mining in Northern Ontario. The scheme has been advanced to a stage which permits of actual construction operations being commenced at once and arrangements to this end are being energetically pushed by I. W. C. Solloway, the manager of the company, who is promoting the enterprise.

In the opinion of those in the mining industry the proposed light-railway system, running as it will through the heart of the silver and gold-bearing formations of Northern Ontario, proven by development and production to be of undoubted permanency, will greatly aid development, for in addition to serving the mining operations the railway will assist in establishing other industries. The railway will handle cordwood, pulpwood and coal, in addition to merchandise, and will facilitate the transportation of low-grade ore, which at present will not stand the high cost of transportation. It is estimated that the business to be obtained from the pulp and lumbering industry alone would justify the building of the railway.

In the district of Temiskaming many of the producing camps will be touched including Swastika, Kirkland Lake, Larder Lake and the adjacent districts of Ben Nevis, Skead Township and Boston Creek. The route provided for is as follows: From Swastika on the T. & N. O. Railway, easterly through Kirkland Lake camps in the townships of Teck and Lebel, then southeasterly through Gauthier and McVittie townships, south through Hearst and Skead townships, turning west from Skead, through Catherine and Pecaud Townships, through Boston Creek Mines, and reconnecting with the T. & N. O. at Boston Creek station. Construction offers no greater engineering difficulties and will follow the loop of gold mines and claims that have become established since gold was first discovered in this area.

Kirkland Lake and Boston Creek districts are now supplied with power from Cobalt by the Northern Ontario Light and Power Company, while Larder Lake district is served by the installation of power supply owned by the Associated Goldfields Mining Company, Limited. It is pointed out by the company that besides the established and producing mines in the areas to be served, there are hundreds of other good claims that will be encouraged to develop by the railway, removing the handicap of inaccessibility for transportation. Capital is flowing into the gold belt freely and the value of the vast mineral wealth contained in these areas has been demonstrated. It is stated that by the close of 1921 the yield of gold will surpass any record of the past. The Kirkland Lake area alone has now nearly forty mines, and then there are the Larder Lake mines, and the Boston Creek properties which will be assisted by the new enterprise, together with those in the Fort Matachewan, Gowganda, and West Shining Tree areas. Many mines at present idle are prepared to operate upon receiving railroad transportation.

As an instance of the need that the railway will supply the case of Kirkland Lake area may be mentioned. Information gathered by the company indicates that throughout the area there is urgent need for a railway to take care of the established mines and the extensive developments that are going on. At present thirty cars of railway ties, not counting pulpwood, are being shipped from Timmins each week and the Porcupine branch, 30 miles long, ships out approximately 25,000 cords of pulpwood annually. Most of the tonnage, consisting of railway ties, pulpwood and lumber, hauled over the Porcupine lumber mills which receive their logs by floating them down the river. This terminus can be compared with the proposed terminus of the light railway company at Beaver House Lake. The Mattagami is, of course, longer than the Beaver House, but to date the number of miles that are being lumbered is not as great as is available on the Beaver House, and the spruce for pulpwood and pine for ties and lumber along the Mattagami is no better than that along the Beaver House. From the Argonaut Mines, which for the present would seem to be the company's objective, access would be gained to Victoria Creek, whose waters afford excellent flotation for logs now standing on approximately fifty square miles of timber rather better than the average quality. After touching Victoria Creek it is but 2½ miles east to the Argonaut Mine at Beaver House Lake, on whose property at the outlet of Beaver House Lake the railroad would cross White River. This river will also bring pulpwood, ties and lumber to the railroad. From Kirkland Lake through Lebel Gauthier and McVittie Townships, many mines are being developed on which plants and mills will be installed, necessitating the hauling of large boilers, mill machinery and large tonnages of coal, timbers and lumber.

It is estimated that the Northern Light Railways will serve an area of about 3,000 square miles containing 1,920,000 acres and within this area located about 11,000 mining claims and many producing mines. These areas have gold, silver, barium, asbestos, felspar, copper, waterpowers, pulpwood, timber and farming land, and in this connection it is interesting to note that in Northern Ontario 47 per cent of the freight carried by the T. & N. O. comes from the mining industry, 13 per cent from the agricultural industry, leaving 40 per cent from the lumbering industry. In the United States 60 per cent of all freight comes from the mining industries, therefore forests and mines are considered the most valuable source of revenues to the railways.

The scheme has been developed with the wholehearted support of the Boards of Trade of Northern Ontario and the mining associations, which have failed to obtain government-owned standard railways. The government's policy is understood to include extension of the T. & N. O. Railway to James Bay, by easy

annual stages, and provision of transportation for the outlying districts by light railway feeders, and the Northern Light Railway Company's project is therefore part of the government's railroad policy.

THE TECK-HUGHES GOLD MINES, LTD.

J. A. McRAE, Cobalt.

Among the mines in the Kirkland Lake district which are being placed upon a sound commercial basis is that owned by the Teck-Hughes Gold Mines, Ltd., a company which has paid strict attention to sound methods in the financing and the management of its operations.

This company had just completed its construction program when it found itself in the midst of an extremely adverse economic situation which was brought about by the recent world-war and which no one had been able to foresee. The cost of conducting operations exceeded original calculations, and the company ultimately found its enterprise saddled with a bonded indebtedness of half a million dollars. As against this, is a mine highly developed to a depth of 500 feet, and equipped with a milling plant which can treat 120 tons of ore daily.

In recent years, it was found difficult to make production cover the cost of operation, a fact which caused the company to neglect the payment of interest on its bonds. The situation was not altogether re-assuring to the stockholders, but the fact was never lost sight of that, although carrying a big bonded indebtedness, this was covered by a vast amount of development work which must eventually be of great value to the company.

It would seem that the Teck-Hughes is now about to come into a fair reward for its perseverence. It is learned that the enterprise is now on an operating basis which is moderately profitable, while a further milling addition to a total of about 140 tons daily has been decided upon, and which seems to offer promise of adding still further to the profits which are to materialize.

There has been considerable unofficial discussion of the financial affairs of the company and that a re-organization might be arranged so as to satisfy bondholders and stockholders alike. As to this, there may or may not be some such a possibility. However, that the management is to be given a free hand to proceed with operations is certain, and whether a re-organization is to be arranged, or not, seems to be secondary to the fact that, as stated to the writer by interests closely identified with the project, there will be no interference with the operation of the mine and the outlook is that the earning power of the company promises to be such as will retire a substantial amount of the bonded indebtedness annually and will then permit the enterprise to produce its reward to the stockholders.

Eastern Equipment Co., Ltd., have moved from the McGill Building and taken the entire floor of 231 Beaver Hall Hill, Montreal, where they will have, in addition to their offices, an extensive show room. This firm have recently been appointed Canadian agents for St. Clair Brothers, Galt, Ont., manufacturers of pumps, concrete mixers, hoists, etc. They also handle new and rebuilt contractors' equipment of all kinds as well as locomotives.

WHY THE PRICE OF ANTHRACITE DOES NOT COME DOWN.

(From "Saward's Journal," New York.)

E. W. Parker, director of the Anthracite Bureau of Information, has written a letter to the editor of the New York Herald taking exception to a recent editorial entitled "Coal Prices Must Come Down." The editorial in question is similar to several others which have appeared in the metropolitan papers since then and which were inspired by the "Herald's" comment. In his letter Mr. Parker said:

"It is quite evident that the writer of the editorial is not in full possession of the facts and conditions with which the anthracite industry is faced at the present time. Permit me to say in the first place that no one would be more pleased to welcome a decline in the price of hard coal than the anthracite operators if that could be accomplished without involving serious loss to the industry as a whole.

"The fact is, however, and it is a very important fact, that in the face of the present cost of production no material reduction can be made in the mine price of anthracite without eliminating a substantial portion of the necessary tonnage or compelling its production at serious loss to the higher cost companies. Some mines are now idle for the simple reason that present prices do not permit of their operation at a profit.

Factors Entering Into Costs.

"There are three factors involved in the cost of coal to the consumer, namely, production, transportation, and local distribution. Including the advance in wages granted by the President's Anthracite Coal Commission last year, the aggregate increase in the labor cost of anthracite over the pre-war period has been 138.6 per cent (see "Monthly Labor Review" of U. S. Department of Labor, October, 1920, p. 104) and the award of this commission fixes the rate of wages until March 31, 1922.

"The labor cost in the production of anthracite represents over 70 per cent of the total expense. The cost of supplies, such as timbering, mine rails, explosives, etc., have practically doubled. The wholesale price of domestic anthracite according to the "Monthly Labor Review" (February, 1921, p. 51) has increased 98.5 per cent.

"It is a matter of common knowledge that freight rates have been advanced approximately 100 per cent, and there is no reason to believe that the retailers' expenses have not increased in the same proportion. The anthracite operators, however, have nothing to do with either the cost of transportation or of local distribution.

Wage Agreement Cannot Be Broken.

"It may be claimed that as the increase in wages subsequent to the agreement of 1916, notwithstanding the existence of a four years' contract, and by the President's commission were granted because of the advancing cost of living, the miners should now consent to reductions in wages before the termination of the existing contract, because of the marked decline in the prices of other commodities.

"It goes without saying that any action of that character would almost certainly precipitate a general strike and effectually stop the production of every mine in the anthracite region. The operators are not willing to break their contract. Is it the opinion of the editor of the "Herald" that it would be wise to make the attempt?"

"In conclusion permit me to call your attention to the fact that there are now before the Governor two bills relating to taxes and charges on anthracite coal. If they become laws the total levy in all probability will amount to 3½ per cent on the mine value of the entire commercial production (coal used in the operation of the mines is exempted) and as 30 per cent of the tonnage consists of steam sizes, sold in competition with bituminous coal and at less than the cost of production, the entire tax will have to be carried by the 70 per cent of domestic coal, which by a simple process of arithmetic will be seen to have to carry a tax of 5 per cent. If the bills become laws they will go into effect July 1."

(Editorial Note.—Since this letter was written the Governor has signed one bill imposing a tax of 1½ per cent on anthracite.)

THREE FIVE-MILE THICK AURIFEROUS GEOLOGICAL AGES.

A correspondent of the South African M. & E. Journal, named as the "Rand Stratigraphist," writes:

This country contains three five-mile-thick auriferous geological ages ahead of the rest of the world, as your readers may be tired of hearing from me. Our gold supply is inexhaustible, and the few mines grouped round about Johannesburg, for convenience sake, do not represent a five-thousandth part of the number of holes in the ground that posterity will yet make to help themselves to the precious metal as long as it remains the medium of currency. That's the rub! For if our platinum fields in the Cape Colony prove to be half as rich as reported its supply might in a few years surpass the world's output of gold—and what then?

With regard to the three five-mile-thick geological ages above alluded to, which South Africa has, and the rest of the world has not, I will just give you a rough estimate of their potentialities cut down to half the distances which I am convinced they reach if our coal-measure age, which covers them to a great extent, could be peeled off to expose them. First, The Lydenburg age: Three payable reefs, 300 miles long=900 miles. Second, the Witwatersrand age: Fifteen payable reefs, 300 miles long=4,500 miles. Third, the Black Reef age: 300 miles long, 6 payable reefs=1,800 miles. Total, 7,200 miles of payable reef if joined end to end.

This does not include the auriferous schistose age, of which we have as much as, and probably more than, any other country, but at present is greatly neglected on account of the more easily worked banket beds of the Witwatersrand and Black Reef ages. Home readers would be well advised not to refer to our Geological Survey reports for information re South Africa, as it is absolutely useless from an economic point of view. They must come here and investigate for themselves,

SAMUEL MONTAGU & COMPANY'S CIRCULAR.

The following items on the precious metals are excerpted from Messrs. Montagu's March circulars.

The Directors of the U.S. Mint has reported that gold supplied for the manufacture of jewellery and other industrial uses in 1919 amount to 75½ million dollars, in excess of the U.S. production for that year of 15 million dollars.

Gold is exported from Abyssinia in the form of rings of which the shape varies. The assay is generally 940 milliemes gold and 54½ silver. Such a quality seems to indicate the metal may be derived from gold dust, and suggests that Abyssinia may be a producer, though not figuring as such in official returns.

It is noted that in China currency is replacing unminted metal, and that the silver dollar is replacing lump silver, which, although a few years ago very scarce, are now as much in circulation as the copper cash.

Successive circulars report a continuance of the heavy flow of gold into the United States, particularly from India. "The repeated hammer-blows caused by these shipments of precious metal—not really desired in the United States, where gold is already superabundant—have had, and, if continued, will have the effect of reducing the discount from which the British pound sterling has been suffering in regard to U. S. currency."

The "Journal" suggests a few harder taps from Northern Ontario in aid of the Canadian dollar would not come amiss.

GOLD AND SILVER TRADING IN THE ORIENT.

Messrs. Samuel Montagu's circular of 7th April states that India supplied China last year with silver when it was quoted Rs. 105 the 100 tolas, and has been buying it back at about Rs 85. India bought great quantities of gold under Rs. 23 the tola, and is now selling it at the profitable price of Rs. 30. Exchange operations between gold and silver in the East are of very ancient origin. The Egyptian code of Menes dating perhaps between one and two thousand years before the present era — is thought by some authorities to be connected with the Indian code of Manu, probably of a much earlier date. In it is a reference to a ratio between gold and silver. We need not therefore be surprised if the people of India are adept at the practice of exchanging the two metals.

MORE POWER DEVELOPMENT IN NORTHERN ONTARIO EXPECTED.

The experience of the past winter has made operators in Northern Ontario take a great interest in water-power development. Recently Hollinger Consolidated Mines, Ltd., applied for rights to develop for its uses one of the yet unharnessed water powers. The Company will need a large supply for many years and could well undertake to develop some power of its own. The immediately outlook is not overly bright. The weather has been very dry this Spring as it was last Fall, as numerous bush fires evidence. The streams are not flowing as strongly as might be wished and the operators will be glad to see a spell of real wet weather. If there is not a liberal supply of rain this Summer, there will be power shortage again next Winter. It is to be hoped therefore that no obstacles will be put in the way of those who would increase the power development.

Northern Ontario Letter

THE SILVER MINES.

The Cobalt District.

Silver production from the mines of the Cobalt field amounted to at least 500,000 ounces during the month of May, according to preliminary estimates. On May 25th, the Mining Corporation of Canada resumed production and this will increase the aggregate monthly output to well over 600,000 ounces a month.

The re-opening of the properties and mill of the Mining Corporation has provided employment for from 230 to 250 men, thereby increasing the pay-roll in Cobalt by upwards of 25 per cent. This has greatly improved the industrial outlook here and is pointed to as a clear indication of the general improvement from the economic conditions which were responsible for the company closing down its mines and mill during the early days of March, last.

It is understood the Mining Corporation has been making an examination of property in the eastern part of the Kirkland Lake district, the Lebel Oro being one of the properties investigated. Surface showings on the Lebel Ore are very promising, a vein measuring from two to four feet in width outcropping at surface in which the gold content makes the deposit of a commercial grade. A shaft has been put down to a depth of about 60 feet at the time of writing, and the result of sampling in the shaft and an examination of the surface will decide the question of further negotiations.

The Coniagas has commenced treating its sand pile, and the aggregate tonnage being handled at this mine now amounts to from 600 to 625 tons daily, made up of 350 tons of run-of-mine ore, 110 to 125 tons of slimes and 150 tons of sand. Last year's average mill-heads amounted to well over 10 ounces of silver to the ton, but allowing for a heavy dilution of the average on account of the large amount of sand and slime, it would appear as though the average might now be estimated at about 7 ounces of silver per ton. This would indicate a daily output of approximately 4,200 ounces of silver, or at the rate of 1,533,000 ounces a year during the period which the plant may be operated at the present capacity. At 60 cents an ounce for silver, plus the premium on United States funds, the present rate of production is close to a million dollars a year.

Elk Lake District.

There is a pronounced tendency to regard the newly-discovered iron-deposits in the townships of Morel and Yarrow with reserve. Part of the deposit was reported upon in 1911, but the recent interest has been based on the discovery of higher-grade material than that dealt with at that time. However, until further details may be secured, followed by extensive exploration work by diamond drilling, it will be quite impossible to accurately estimate the merits of the deposit.

The question of installing a mill on the Castle property of the Trethewey Company, at Gowganda, is still under consideration but no definite decision has so far been reached. It is believed a small plant may be installed, adequate to treat about twenty tons of ore daily, and to draw ore which would average about 50 ounces of silver per ton. This is about the average grade as so far determined and, although fair-sized shoots of high grade permit an occasional shipment to the railway, yet the general average of 50 ounces to the ton is not sufficiently rich to pay for the long haul and it is for this reason that a small mill on the property is regarded as a necessity. It is planned to extend the shaft from its present depth of 170 feet to a depth of 270 feet and carry on lateral operations at that point.

The scheme to build light, narrow-gauge railways through the outlying mining districts, including Gowganda, holds out promise of solving the transportation difficulties of this promising silver-bearing area. All property owners appear to be prepared to strongly support the project now that it appears likely to become a reality with experienced men behind it.

Should the plans of the promoters of the scheme materialize, the new line may be in operation from Swastika to Gowganda by the end of this year, in which event it seems reasonable to expect quite a revival in activity to occur throughout the Gowganda district. There are numerous promising prospects in this field, some of which develop successfully were the unsatisfactory and expensive transportation handicap to be overcome.

Quotations for silver remain weak, in spite of the exceedingly small production as compared with normal conditions. Various opinions are expressed as to the cause or cause for the low price of the metal, but these opinions are more or less confusing and conflicting. After studying the opinion being expressed by metal authorities, and not forgetting the varied ideas which take on the aspects of guesses, it is the opinion, or guess, if you will, of the "Journal" correspondent that the weak quotations for commercial bar-silver are due to the impoverishment of the European nations as a result of the war. In a word, the evidence goes to show that the world really requires silver but is too poor to pay for it. Time alone will adjust this situation in the natural working-out of the law of equilibrium.

THE GOLD MINES.

The Porcupine District.

During the fiscal year ended March 31st, the Dome mine produced $1,916,403 in spite of operating under the serious difficulty of a pronounced shortage of hydro-electric energy during the closing five months of the period. The ore contained an average of $7.50 a ton, and recovery amounted to $7.11 a ton, or 94.72 per cent. The total operating cost was $1,239,508. This included mining, development, crushing and conveying, milling, administration taxes, and insurance and left a net balance of $706,891. In addition to this the company received $247,356 made up as follows: $183,081 on exchange, $51,275 interest on bonds, $8,216 bank and miscellaneous interest and miscellaneous income of $1,781. This made a total profit of $954,250 for the year, against which is charged $651,770 for depreciation, depletion, and Dominion Government income war-tax, thereby leaving a net profit for the year amounting to $302,480.

The Hollinger Consolidated is having a preliminary survey made of Kettle Falls with a view to ascertaining the volume of the flow, and other details in connection with harnessing this power. The distance separating the falls from the mine is about sixty miles due north, and the intervening territory presents no serious obstacles in the way of transmitting power provided it should be finally decided to go ahead with the scheme.

A shaft has been sunk to a depth of 150 feet on the property of the Union Mining Corporation, situated in the township of Whitesides, lying about 25 miles south

west from Porcupine. A station is being cut at this depth, where it is planned to carry on lateral work on three veins, one of which is approximately eight feet in width and is said to carry commercial gold-values. Transportation is not very favorable, but the Ontario Government is stated to have expressed its willingness to improve the road. The company is considering the installation of a mill within the next few months, but the plan will probably be held in abeyance pending the improvement of the road.

The work of deepening the main shaft of the McIntyre-Porcupine from its present depth of 1,550 feet is proceeding. The objective is 2,000 feet, with the intention of perhaps carrying the work to a depth of 3,000 feet within the next two years or so. The mine is shaping up in a big way, and by the end of this year will treat about 900 tons of ore daily as compared with a former rate of an average of 550 tons daily.

An endeavor is being made to arrange a resumption of work on the Whelpdale property lying north of the town of Timmins. Former underground work on this property proved the existence of a number of strong veins. Gold values were comparatively low as found in previous work, but prospects are believed to warrant a further extensive plan of exploration work.

A syndicate, in which Toronto interests are identified, has under contemplation a scheme to re-open the Hollinger Reserve property, situated in the township of Deloro a few miles south from the Hollinger mine.

Prospectors are spreading out over the country in various directions and, although the number of men in the field is not large, yet the nature of their activities is such as to offer promise of interesting developments in the outlying districts. These men now have the advantage of comparing their prospects with properties on which real success has been achieved and the element of gamble is thereby reduced considerably.

Kirkland Lake District.

During the month of April, according to the regular monthly statement issued by R. C. Coffey, manager of the Lake Shore Mine, the mine produced $22,214. The mill ran 93.64 per cent. of the possible running-time and treated a total of 1,860 tons of ore. This daily average of 62 tons is the highest so far achieved in the mill, although the average grade of the ore was the lowest for any month since milling commenced.

This low gold-content is due to the fact that it is the policy of the company to treat the material coming from development work and in which there is of necessity considerable waste rock.

At the 400-ft. level, 83 feet of drifting, 72 feet of raising and 51 feet of cross-cutting was done, while at the 600-ft level, a total of 146 feet of cross-cutting and 85 feet of drifting was done. This made a total of 437 feet of work during the month, or at the rate of approximately one mile a year.

In carrying on such extensive development work, an enormous amount of ore is being developed for future milling-requirements, and the tonnage coming from development work alone is adequate to feed the present mill, and does not permit drawing any of the high-grade ore which is being broken in the stopes where the average gold content is well over $20 per ton, and in large sections actually amounts to an average of between $25 and $30 to the ton.

A body of ore seven-feet in width, and containing $21 per ton has been cut by a diamond drill operating from the 900-ft level of the property of the Kirkland Lake Mining Company. In lies in close proximity to the main shaft. It is also officially stated to the "Journal" that a large body of ore is being developed near the shaft at the 700-ft. level, and the general physical condition of the mine is very favorable.

The work of pouring cement for the foundation of the new 100-ton mill on the Ontario-Kirkland mine will commence about the middle of June. In the meantime, the frame-work for the structure itself is being prepared and the work of construction will be speeded up so as to place the property on a producing basis in October.

A. G. Burrows and P. E. Hopkins, Ontario government geologists have completed the field work in the northern part of the township of Skead, and it is expected that the map of the whole district will be printed some time in July.

The work of gravelling the new road from Boston Creek to the centre of activity in Skead is proceeding at a good rate, this government assistance having been given following a demonstration of good faith by claimholders who themselves performed the first work of opening the twelve-mile road for wagon traffic.

These claimholders again formed a "working bee" on May 19th, according to information just sent out by a mining man of that district, and with eighteen prospectors and miners equipped with axes, saws and stumping powder, cleared nearly two miles of road in a single day, thereby putting St. Anthony lake in touch with the main road.

This road work is of especial interest to those pioneering in the newer districts of Northern Ontario, showing as it does a high degree of cooperation between the pioneer and the government.

A GEOLOGIST AS A PROPHET.

United States Geological Survey's Estimates of Natural Gas in Texas Prove Accurate.

An estimate made in 1915 by the United States Geological Survey, Department of the Interior, of the quantity of natural gas available to Dallas, Fort Worth, and other Texas cities has proved to be very nearly correct. Though recognized as a hazardous undertaking, it is evidently possible to make, on a sound scientific basis a fairly close and very useful estimate of the quantity of unrecovered natural gas in any particular region. The estimate made indicated a supply in the Petrolia field—the main source of supply—sufficient for three or four years, though it was noted that there would be shortages in cold weather, if this supply were not supplemented by gas from other sources. E. W. Shaw, the Survey geologist who made the estimate, concluded that the Petrolia field contained 70 billion cubic feet. That field is now nearly exhausted, and the estimate has proved good, the shortage of gas being the occasion for a new examination and report in 1920.

It was also pointed out in 1915 that gas should be brought from Oklahoma, and this was done, lengthening the period of gas burning in these cities from three or four years to five years. Finally the belief was expressed that new oil fields containing both gas and oil would be discovered in Texas, and drilling in the region west of Fort Worth was urged. This region has now been drilled and a large supply of gas has been made available, so that these cities may expect to have gas several years longer—for many years if waste could be eliminated.

TORONTO MINING STOCK QUOTATIONS.

Quotations on Active Stocks on Standard Stock Exchange Quotations for Week Ending 28 May, 1921.

	High	Low	Last
SILVER			
Adanac Silver Mines, Ltd.	1	1	1
Bailey	2 7/8	2 7/8	2 7/8
Beaver Consolidated	34	32 1/2	33
Crown Reserve	12 1/2	12 1/2	12 1/2
Gifford	7/8	7/8	7/8
La Rose	21	18 3/4	21
Mining Corp. of Canada	1.10	1.10	1.10
Nipissing	5.20	5.15	5.15
Peterson Lake	6.10	6.10	6.10
Silver Leaf	2	2	2
Trethewey	16 1/2	16	16 1/2
GOLD.			
Atlas	22	21	21 1/2
Dome Lake	4 1/4	4	4
Dome Mines	21.25	20.05	21.00
Gold Reef	3 3/4	3 1/4	3 3/8
Hollinger Cons.	7.32	7.25	7.28
Hunton Kirkland G. M	9 1/2	9 1/2	9 1/2
Keora	13 3/4	13	13
Kirkland Lake	19 1/2	18	18
Lake Shore M. Ltd	1.32	1.30	1.31
McIntyre	2.00	1.93	1.98
Moneta	12	11 3/4	12
Newray Mines, Ltd	6 1/2	6	6 1/2
Porcupine Crown	22	20	21
Porcupine V. N. T.	21	21	22
Schumacher	25	23	23
Teck-Hughes	16	16	16
Thompson Krist	7 1/2	5 1/2	5 7/8
West Dome	8 1/2	8 1/4	8 1/4
West Tree Mines, Ltd.	1 3/4	4 1/2	1 1/2
OILS.			
Rockwood Oil, Gas	1 1/2	1 1/2	1 1/2
Vacuum G.	7	7	7

MONTREAL METAL QUOTATIONS.

Following the fair average prices for ingot metals (in less than car-loads) at Montreal:

	May 26	June 1
Copper, Electric	18 1/4	18 1/4
Copper, Casting	18	18
Tin	40 3/4	39 1/2
Lead	7 3/4	7 1/4
Zinc	7 3/4	7 1/2
Aluminum	33	32
Antimony	7 1/2	7 1/2

TORONTO COAL PRICES

Toronto, June 2.—There have been no changes in the prices of the various grades of coal during the past ten days or two weeks. Slack is quite easy and fairly plentiful. Points on the lower lakes are pretty well filled up with lump coal and it looks as if an embargo against further shipments will have to be put on which would have a tendency to strengthen the slack market. Anthracite is tightening and there is a noticeable difficulty in obtaining good quality stove sized coal. Slack is ranging from $1.10 to $1.90 f.o.b. mines at the mines, lump, from $2.35 to $3.15, smokeless, from $2.35 to $3.15; smokeless, from $2.35 to $3 for mine run. Anthracite is twenty per cent above the circular prices and the independents are charging from fifty to seventy per cent on the advertised prices, which makes chestnut and stove in the neighborhood of $7.85.

The Canadian Miners' Buying Directory.

Acetylene Gas:
Canada Carbide Company, Ltd.
Prest-O-Lite Co. of Canada, Ltd.

Acetylene Welding:
The Toronto Iron Works, Ltd.

A.C. Units:
MacGovern & Co
Powley & Townsley, Limited.

Agitators:
The Dorr Co.

Air Hoists:
Canadian Ingersoll-Rand Co., Ltd.
Mussens, Limited.

Air Receivers:
The Toronto Iron Works, Ltd.

Alloy and Carbon Tool Steel:
International High Speed Steel Co., Rockaway, N.
Peacock Brothers Limited.

Alternators:
MacGovern & Co

Aluminium:
Spielman Agencies, Regd

Amalgamators:
Northern Canada Supply Co.
Mine and Smelter Supply Co
Wabi Iron Works.

Antimony:
Canada Metal Co.

Antimonial Lead:
Pennsylvania Smelting Co

Arrester, Locomotive Spark:
Hendrick Manufacturing Co.

Assayers' and Chemists' Supplies:
Dominion Engineering & Inspection Co
Lymans, Limited
Mine & Smelter Supply Co.
Pennsylvania Smelting Co.
Stanley, W. F. & Co., Ltd.

Ash Conveyors:
Canadian Link-Belt Company

Ashes Handling Machinery:
Canadian Mead-Morrison Co., Limited
Canadian Link-Belt Co., Ltd

Assayers and Chemists:
Milton L. Hersey Co., Ltd
Campbell & Deyell
Ledoux & Co.
Thos. Heys & Son
C. L. Constant Co.

Asbestos:
Everitt & Co

Balls:
Canadian Foundries and Forgings, Ltd
Hull Iron & Steel Foundries, Ltd.
Peacock Brothers Limited.
The Wabi Iron Works.
The Hardinge Conical Mill Co
The William Kennedy & Sons, Ltd.

Ball Mills:
Hardinge Conical Mill Co.
Hull Iron & Steel Foundries, Ltd.
Mine and Smelter Supply Co.
The Wabi Iron Works.
The William Kennedy & Sons, Ltd

Balances—Henssler:
Mine and Smelter Supply Co

Babbit Metals:
Canada Metal Co.
Hoyt Metal Co.

Ball Mill Feeders:
Hardinge Conical Mill Co
Hull Iron & Steel Foundries, Ltd

Ball Mill Linings:
Hardinge Conical Mill Co
The William Kennedy & Sons, Ltd
Peacock Brothers, Limited
Hull Iron & Steel Foundries, Ltd

Belting—Leather, Rubber and Cotton:
Canadian Link-Belt Co., Ltd.
The Mine & Smelter Supply Co
Northern Canada Supply Co.
Jones & Glasco.

Belting:
R. T. Gilman & Co
Gutta Percha & Rubber, Ltd

Belting—Silent Chain:
Canadian Link-Belt Co., Ltd
Hans Renold of Canada, Limited, Montreal
Jones & Glasco (Regd.)

Belting (Transmission):
Goodyear Tire & Rubber Co

Belting (Elevator):
Goodyear Tire & Rubber Co

Belting (Conveyor):
Goodyear Tire & Rubber Co
Gutta Percha & Rubber, Ltd.

Bins and Hoppers:
The Toronto Iron Works, Ltd.

Blasting Batteries and Supplies:
Canadian Ingersoll-Rand Co., Ltd
Mussens, Ltd.
Northern Canada Supply Co.
Canadian Explosives, Ltd.
Giant Powder Co. of Canada, Ltd.
Powley & Townsley, Limited.

Bluestone:
The Consolidated Mining & Smelting Co
The Conlagas Reduction Co., Ltd.

Blowers:
Canadian Fairbanks-Morse Co., Ltd
MacGovern & Co., Inc.
Northern Canada Supply Co.
Fraser & Chalmers of Canada, Ltd.

Boilers:
Northern Canada Supply Co.
Canadian Ingersoll-Rand Co., Ltd
Marsh Engineering Works
MacGovern & Co., Inc.
R. T. Gilman & Co.
Fraser & Chalmers of Canada, Ltd
The John Inglis Company
Wabi Iron Works.

Blue Vitriol (Conlagas Red):
Canadian Fairbanks-Morse Co., Ltd

Bortz and Carbons:
Diamond Drill Carbon Co.

Boxes, Cable Junction:
Standard Underground Cable Co. of Canada, Ltd
Northern Electric Co., Ltd.

Brazilian Rough Diamonds:
Diamond Drill Carbon Co.

Brazilian Mica:
Diamond Drill Carbon Co.

Buggies, Mine Car (Steel)
Hendrick Manufacturing Co

Brazilian Ballas:
Diamond Drill Carbon Co.

Brazilian Rock Crystal:
Diamond Drill Carbon Co.

Brazilian Tourmalines:
Diamond Drill Carbon Co.

Brazilian Aquamarines:
Diamond Drill Carbon Co.

Bridges—Man Trolley and Rope Operated—Material Handling:
Canadian Mead-Morrison Co., Limited

Bronze, Manganese, Perforated and Plain:
Hendrick Manufacturing Co.

Buckets:
Canadian Ingersoll-Rand Co., Ltd
Canadian Mead-Morrison Co., Limited
The Electric Steel & Metals Co
R. T. Gilman & Co.
Hendrick Manufacturing Co
Canadian Link-Belt Co., Ltd.
Marsh Engineering Works
Mussens, Ltd.
MacKinnon Steel Co., Ltd
Northern Canada Supply Co
Fraser & Chalmers of Canada, Ltd
The Wabi Iron Works

Buckets, Elevator:
Canadian Link-Belt Co., Ltd
Hendrick Mfg. Co
Peacock Brothers Limited.

Cable—Aerial and Underground:
Canada Wire & Cable Co
Northern Canada Supply Co
Standard Underground Cable Co. of Canada, Ltd
Peacock Brothers, Limited

Cableways:
Canadian Mead-Morrison Co., Limited
Fraser & Chalmers of Canada, Ltd
Mussens, Ltd.
The Wabi Iron Works
R. T. Gilman & Co.

Cages:
Canadian Ingersoll-Rand Co., Ltd., Montreal, Que.
Northern Canada Supply Co
Fraser & Chalmers of Canada, Ltd
The Electric Steel & Metals Co
The Mine & Smelter Supply Co
Mussens, Ltd
The Wabi Iron Works

A COMPRESSED-AIR BORING-AUGER FOR COAL.

The Westphalian mining weekly "Gluckauf" for 7th May contains a description of a coal-boring auger driven by compressed air which it is stated has been used for some time with good results in a number of Westphalian collieries. The weight of the machine, without the twist-drill or boring-auger is 22 pounds, which can be lessened if aluminium is used for the housing. Test borings in hard coal show that the drill can bore to a depth of 2 metres in two minutes is recorded. The fatiguing effect of the hammer-drill on the operator is said to be avoided. The amount of dust made is also said to be much less than that made by the hammer-drill, and the coal is not reduced to so fine a state by the rotating drill as it is by the blows of a hammerdrill, and the manner in which the auger-drill is withdrawn gives a shot-hole much freer from particles of coal and from fine dust. The comparatively silent working of the drill enables the miner to detect noises indicating movements in coal and roof more easily, conducing to safer working. The rapidity with which the rotating drill works, and its smaller air consumption during a smaller period of operation is said to make much less exacting demands on the air-pressure available.

As an example of the method in which the compressed-air drill is used in a Westphalian colliery, it is stated that one man, specially entrusted with this work, bores all the shot-holes for 100 miners with one machine. The borer carries the machine in a box with necessary accessories. As compared with a hammer-drill type of borer it is said the rotating-drill type enables an increase in coal production of 20 tons per shift of 100 miners.

A special feature of the particular type of drill described is the lubricating mechanism which is based on saturating with oil a small part of the incoming air. The device is said to ensure perfect lubrication with a minimum use of oil.

CHANGES IN STAFF OF DOMINION COAL COMPANY.

The Dominion Coal Company recently reintroduced the system of dividing its collieries into superintendence districts, and a number of changes are announced consequent on the appointment of Alexander McEachern, formerly superintendent of No. 1 District, as chief inspector of mines for the Company.

Alexander MacDonald is appointed in charge of No. 1 district, comprising collieries 1, 2 and 9.

P. T. Prendergast, is promoted from assistant superintendent of No. 1 district, to charge of No. 3 district, including collieries 4, 6, 21 and 22.

A. D. Matheson is prompted to superintendence of No. 2 district, comprising collieries 5, 10, 11 and 24.

No. 4 District, including collieries 12, 14, 15, 16 and 17, remains under superintendence of J. C. Nicholson.

A Jarosite Deposit in Victoria, Australia.

"Chemical Engineering & Mining Review," Melbourne, in the issue of March 5th reports the existence of well-defined seams of jarosite in the cliffs near Anglesea, Victoria. This little-known mineral is described as a basic sulphate of iron and potassium, and in composition corresponds to its better-known sister mineral, alunite, which is a basic sulphite of aluminium and potassium. Jarosite may be described as alunite in which iron has taken the place of aluminium. Economically the mineral can be made to yield sulphuric acid, and pigments, and a company is being formed to develop the deposit for commercial uses Jarosite is a bright yellow mineral, and is sometimes known as yellow iron-ore. The deposits associated with the jarosite seams are carboniferous sands, containing much pyrites and casts of leaves, and in one place a definite seam of low-grade coal is observable. The jarosite seams are thought to have been formed by leaching of the pyrites by water and subsequent concentration of jarosite in jointings of the carboniferous sandstone.

EDITORIAL

The Prescience of Canadian Geologists

One of the most useful publications of the Geological Survey is the descriptive sketch of the geology and economic minerals of Canada by Young and Brock issued in 1909. It is the only publication available to the general public—if indeed it is not the only publication available anywhere—that deals with the economic geology of Canada as a whole in a manner to be understood of the people. Moreover it contains that extremely scarce but often-required reference, a geological map of the Dominion. This excellent publication is, however, very much out of date, and that it should be so obviously so is a testimonial to the rapidity with which certain phases of the mineral industry in Canada have developed. The correctness of Dean Brock's introductory remarks are now revealed as noteworthy. He wrote: "The amount of mineral-bearing territory still awaiting the prospector is prodigious, the greatest in fact that now remains anywhere on the globe. The mining industries of the country may be said to have only just begun".

Some quotations are of present interest. With regard to petroleum, the volume states: "There is evidence of the probable existence of a petroleum field in the north". The authors could not have foreseen Fort Norman and Imperial Oil monoplanes, but their forecast speaks for itself.

With regard to gold in Ontario, it is recorded that "though gold has been found and worked at many points in Ontario, from the Lake of the Woods on the west to the Hastings district in the east, a distance of roughly 650 miles, yet in spite of often highly-promising showings no permanent gold industry has been established. . . . . There is however reason to believe that eventually, as prospecting progresses, the mineral will be found throughout the pre-Cambrian region". Since this prescient opinion was written there has developed Porcupine, Kirkland Lake and other pre-Cambrian occurrences of gold that show daily increasing importance and hope of permanence.

Manitoba is mentioned as containing a pre-Cambrian exposure with similar potentialities to the—at that time—unprospected area of northern Ontario and Quebec. But there is no mention of Manitoba as a mining province in 1909.

Concerning asbestos, the statement is still as true now as in 1909 that the Quebec deposits are the most important in the world. It is regrettable to note, however, that the only monograph on asbestos occurrence and asbestos mining in the whole field of technical literature, that of Fritz Cirkel issued by the Geological Survey in 1910, is out of print, and there is a real need for a new monograph regarding a mineral that is much more important to Canada, as it is much more important to the world, at this date than it was twelve years ago. With the exception of "Chrysotile Asbestos" there is not, so far as can be ascertained, any available manual on the mining, milling and preparation of asbestos.

In the matter of coal, Alberta plays an insignificant role in 1909, less than two million tons being produced. The attention which would require to be given to Alberta coal deposits in 1921, as compared with that given in 1909 is as two million tons is to seven million tons.

In 1909, Ontario was recorded as the only province producing salt. This is by no means the case today. Similar instances might be multiplied. Sufficient has been stated to indicate that the prescience of Canadian government geologists based on partial knowledge and intelligent deduction therefrom, has been abundantly vindicated, and the record is one that justifies every cent of financial expenditure made on the Survey. In some respects the record stands as an indictment of folly against the uninformed parsimony that has shaved down the Geological Survey appropriation to inadequate proportions.

A revision of the 1909 volume of Young and Brock and a new monograph on asbestos are two expenditures that would be fully justified even at a time when our Senate has decided it cannot afford to save money, and for this amazingly inconsistent reason has killed the Research Institute Bill, thereby emulating in unreason the extinction of the Commission of Conser-

vation by the House of Commons. There are yet, as "John A." is said to have remarked, people who are fools enough to believe in these things but the elect are evidently in a minority among our legislators. One can only surmise that their indifference to scientific research arises from lack of knowledge of its value.

THE RESEARCH INSTITUTE BILL.

Many sins have been committed in the name of economy, and the killing of the Research Institute Bill by the Senate is one of them. It would have been better had the senators attributed their action to any motive but that of economy, because the essence and the soul of the Research Institute proposal was that of economy. Not of course that unlovely and foolish imitation of economy known as parsimony, but true economy, the art of making much out of little, or what is ignorantly regarded as little. In all probability the coincidence of the proposal to abolish the Commission of Conservation with the proposal to institute the Research Institute was the main occasion of the action of the Senate, it being an obvious inference that the last-named body would supersede and take over the duties of the first-named. Obvious as such an assumption might seem, it would necessarily be incorrect, as the scope of the work of the Commission of Conservation did not touch, let alone conflict, with that of the proposed Research Institute, and it will later be recognised that the abolition of the Commission of Conservation is an error equal to that made in preventing the creation of the Research Institute.

The members of the Senate who spoke against the bill for a Research Institute referred to the enormous financial deficit of Canada, and the undesirability of adding to it by the creation of another department entailing some cost. The existence of this deficit is, to a considerable extent, a result of lack of utilization of our own natural resources, and Senator McLennan well said it would be a pity if economy were exercised in a quarter and upon a project which would retard national progress.

The action of the Senate is less understandable when it is known that it has been conducting an enquiry into the natural resources of Canada, with particular regard to fuel, oil-shales and iron-ore. Certain members of the Senate are very well aware that Canada is threatened in everything that pertains to the comfort and happiness of her people, and in her very existence as a sovereign state, by the deplorably inadequate state of development of her fuel and iron-ore deposits, by waste of forests and fisheries, and lack of oil-yielding resources under commercial development. Senator Beaubien assessed the action of the Senate accurately by saying that rejection of the bill would place a grave responsibility upon the Senate. It is merely an aggravation of the Senate's action in reversing the decision of the House of Commons, and in assuming responsibility for blocking a policy that is being followed by every enlightened nation, to plead economy. It is not economy for Canada to buy goods abroad that can be mined or produced at home, and it is the finest economy to develop processes that will prevent such a necessity. Senator Dandurand feared the country was entering a field that would involve the expenditure of millions of dollars, "something it could not afford". Those who see how perilous Canada's position really is were hoping the country would have the courage and the wisdom to take precisely the action feared by Senator Dandurand, and believe the short-sighted parsimony that dictates caution in the development of scientific research is also precisely what Canada cannot afford, and the very thing that is making her poor and appallingly dependent. Those who oppose the formation of a Research Institute "purely on financial grounds" as Senator Turiff expressed himself, might find much better fields for economy.

It is only possible to assume that the necessity for a Research Institute is not comprehended by the Senate, as a whole. Possibly the Senate, and other bodies representing the Canadian people, would take a different view of their responsibilities if they realised that unless Canada does very quickly begin to use what raw materials she possesses, the Senate and all other bodies of popular government will disappear because we shall be absorbed by nations who do believe in helping themselves.

CHANGES IN NORTHWEST OIL REGULATIONS.

The Government has amended the Oil and Gas Regulations of the Northwest Territories in two important particulars. In these columns in our issue of 18th March the "Journal" pointed out the propriety and desirability of granting to the holder of a permit to search a location for oil, the first option of a lease of the three-quarter location reserved to the Crown under the regulations as originally issued. This necessary and fair provision has now been made.

The clause requiring the discoverer of oil in paying quantities to use due diligence to maintain production has been amended so as not to require the continuous pumping of oil from the date of discovery. The provision was of course one impossible to comply with until the problem of transporting any oil that may be found to market or railhead, is overcome.

Representations are being made by western newspapers that grouping of locations and common use of a drilling equipment is apparently forbidden by the Regulations, and it seems probable that permission for grouping will have to be given. There seems no good reason why it should be disallowed.

Despite the tenor of the regulations, which are understood to be aimed at preventing the formation of anything approaching a controlling interest or a combine in the exploitation of the putative oil-wells of the Northwest, it is becoming clearer that unified effort in proving and operating the oil formations, and in providing means of transportation, will be a necessary

preliminary to commercial success. While the motives of the government may be good and conceived in what passes for righteousness in popular belief, yet the future will surely prove (should flowing oil-wells be discovered) that the maximum production of oil, at the cheapest cost, over the longest period of yield, will only be obtained from the remote Northwest, when, by commercial evolution, the operation of the oil-wells falls into the hands of very large companies, controlling properties so grouped and of such an area as will practically amount to a concession, in the usual meaning of that term. The course of events between this date and the coming of the Northwest as a great commercial oilfield (always provided the oil is there) will be of a nature that will damage the physical condition of the oilfields, will increase operating expenses, will bring about unjustifiable capitalizations and property valuations, and generally, by unloading individual obligations upon a field that is only suitable for single operation and management, result in increasing the unit cost of whatever oil may be produced when the field settles down to commercial operation and competition against other oilfields more favourably situated.

EN PASSANT.

The reduction of freight rates on coal in the prairie provinces during the Summer, and the news that the Alberta Trade Commissioner has been in Prince Rupert looking into the possibilities of that port as an outlet for Alberta coal, are two signs of the wide-awake and constructive character of the policy of the western coal operators. The Alberta people quite evidently know what they have in the way of coal, know what they want to do with it, and go after business.

The resumption of production at the Nickel Plate gold-mine in British Columbia is cheerful news. By the smallness of Canada's production in coal and iron the premium on New York funds appears likely to be maintained and while to most people the discount on the Canadian dollar is a bugbear and an irritant, it is quite otherwise to miners of gold and silver bullion and asbestos. Gold production bids fair to bulk largely in Canadian mineral returns in 1921.

The policy of the Dominion Steel Corporation in providing a scheme of pensions for the attainment of the retiring age and a specific number of years in the service of the Corporation, or its predecessors, is a good one. The lack of such a provision has in the past placed executives in a position of undesirable and undeserving onus, and experience has abundantly shown that a proper pension provision is necessary in any and every corporation which aspires to corporate importance and has any pretensions to financial strength, or looks forward to the attachment of a capable staff in years that are to come.

The formation of a branch of the Canadian Institute of Mining & Metallurgy at Nanaimo is an interesting result of the Secretary's tour. There ought to be material in such an old-established coal-mining district as Vancouver Island for the making of a branch that will rival the Mining Society of Nova Scotia, which holds up the credit of the coal miner in the extreme East. There is a very considerable similarity between the problems of coal-mining in these two widely separated localities.

In substituting electric miners' lamps for oil-flame safety-lamps in its mines, the Dominion Coal Company is doing excellently well. The electric lamp has many merits, which have been set forth in previous issues of the "Journal", but its chief merit is that of safety. In comparison with the naked light, the gauze-screened, oil-flame safety-lamp had a right to its title, and it has had a long and honoured career; but, in comparison with it, the title "safety-lamp" should now be awarded to the electric lamp.

A correspondent to the S. A. Mining & Engineering Journal, whose ideas on stratigraphy, if unorthodox, have at least the merit of limpid simplicity, advises "home readers" in South Africa not to refer to the publications of the Geological Survey for information, as these "are absolutely useless from an economic point of view". It all depends on the interpretation of the word. From the standpoint of the shady stock promoter's economics we believe the publications of the Canadian Geological Survey will also be found absolutely useless. In fact they are worse than useless, they are an impertinence and an offence and a veritable rock of stumbling.

PERSONALS.

Mr. R. W. Brock, who has been visiting in Ontario and the United States, has returned to British Columbia.

Mr. A. G. Burrows and Mr. P. E. Hopkins have returned to Toronto, and are completing a geological map of Skead township.

Hon. Harry Mills, Minister of Mines of Ontario, is visiting mining districts along the T. & N. O. Railway, including Cobalt, Porcupine and Kirkland Lake.

Mr. A. R. Thomas is in charge of development work at the Tough Oakes Mine for Kirkland Lake Proprietary, Ltd.

Dr. W. G. Miller, Provincial Geologist of Ontario, is visiting gold and silver mines in Northern Ontario.

Mr. H. W. Hardinge of New York is visiting gold mines at Porcupine and Kirkland Lake.

Mr. Robert Bryce of Toronto is examining properties at Kirkland Lake.

A meeting of the directors of Hollinger Consolidated was held at the mine last week.

Mr. H. P. De Pencier, manager of Dome Mines is of Toronto.

Mr. R. J. Innes, manager of McIntyre Porcupine Mines has returned to the mine after a few days in Toronto.

Anglo-Persian Activity in New Brunswick Oil Shales

Eight-ton Testing Plant in Operation, Technical Staffs Being Increased and Larger Plans Being Framed When Results Satisfactory.

By ALEXANDER GRAY.

The Imperial Government, through the Anglo-Persian Oil and D'Arcy Exploration Companies, is making a practical test of the New Brunswick Oil shales.

As the Imperial Government owns a controlling interest in the common stock of the Anglo-Persian company, New Brunswick is in a receptive if somewhat passive mood. In all but its specialties, that has been New Brunswick's habit.

Anyhow, the village of Rosedale on the Albert and Harvey branch of the International Railway, and environs, are a center of scientific and industrial interest —because of the re-birth of shale enterprises.

Rosedale was Baltimore. The old maps show it. Those maps indicate that the shales, in addition to farming and lumbering, provided the incentive for the construction of the aforesaid Albert and Harvey railway. Otherwise Rosedale went into partial eclipse. Apart from the records providing that prospectors and premature promoters acquired and retained areas, there was little to expedite capital expenditure in mineral resources. Certainly there was a Baltimore Railway and Mining Company, Albert Mines, holdings supposed to possess a kind of coal, oil, gypsum, and what not. Seventy years ago was an era of Great Expectations in and about Baltimore. Occasionally in the interim brave men have maintained the section has the elements of wealth in profusion—but not until now have the most optimistic of those felt their hopes are to be realized.

New Brunswick submissively awaits results of the initial operations under the auspices of the Anglo-Persian Company and its subsidiary, the D'Arcy Exploration Company. It is not to be implied that New Brunswick has foresworn allegiance to lumbering, pulpwood and fishing—if we exclude politics. No New Brunswicker worthy his nativity would forego these heritages. First and foremost he is a fighting partisan. Not infrequently rivalry as between Halifax, St. John and Moncton varies the procedure. Self-centered farmers, too, give thought to the probability of cheese going to 15 cents this Summer. Potatoes having been a "bad bet" are likely to "come back." Not unnaturally preferment is cherished for what made New Brunswick self-conscious of its prowess.

The determinations under way at Rosedale evoke only the slightest comment—and are untalked of by all excepting those who are anticipating rewards for years of weary waiting in which their patience and purses were exhausted; those operating the Wallace distilling plant and those engaged in ascertaining the approximate extent of the oil shales.

So complacent is the native New Brunswicker toward the mineral resources of his Province, he is debating whether or not it is advisable to put out his own coal for his own comfortable and efficient National Railway, or to continue to use the Nova Scotian product. In timber, cordwood—saw-logs and slabs—mixed farm-products and fish, New Brunswick revels—not infrequently pausing to take a fling at the millions expended upon dredging, concrete work and breakwaters in and about a certain portion of St. John Harbor.

Moncton's natural gas and what oil assiduous drilling brought to surface, long since ceased to be a novelty, however economical in the household where calories from elsewhere are not mis-spelled choleries. Recurring annual references to the potentialities of New Brunswick's oil shales threatened to become perennial until noted scientists placed their hall mark of approval upon them and enabled Mr. Mathew Lodge and Sir William Mackenzie to enlist, by proxy as it were, the Imperial Government through the Anglo-Persian Company, the latter, at the moment, being the most reticent party to what is happening, while Mr. Somerville, the Scotch shale expert, is making comparative tests.

For all of which there was and is a good and sufficient reason. Matter-of-fact New Brunswickers concentrated their energies upon forests and streams, the more expansive coastal waters; put their money into selected and select securities, one of the consequences being that lessees of oil shale lands and problematical petroleum country—which subsequently yielded gas enough to supply most of Moncton for a while—had to go elsewhere for financial assistance.

Therein New Brunswickers displayed their hard-headedness. Consequently, it required half-a-century for the most expert in modern oil-economics to discern in the oil shales of New Brunswick, Utah, Colorado, Wyoming and other districts what they are now described to be: "The second line of industrial defence." Furthermore, and to begin with, the distinguished service rendered by Dr. James Young in manufacturing paraffin from shale oil, had not influenced other than Scottish shale-owners. Singularly enough, too, Western world scientists and embryotic capitalists confusedly and varyingly designated the New Brunswick deposit as "Coalite," "Albertite," and "Cannel" coal—neither of which it happened to be.

The shales of Albert county are identical with the Scotch shales—only it is claimed in behalf of the former that they are richer in oil and sulphate of ammonia. Anyhow, there was no catastrophe accompanying the discovery of this "Albertite," such as attended the first flowing oil-well on Troublesome Creek, Virginia 103 years ago, when there was a rush of "The Devil's Tar," as the astonished driller characterized it, according to Mr. Victor Ross in his "Evolution of the Oil Industry."

Dr. Young and his Scottish experiments contributed largely to the industrial adaptation of petroleum, which was a revolution of universal moment. It is more than co-incidental that Troublesome Creek product subsequently became one of the ingredients of a medical oil made by a chemist named Kier, who also experimented with the "Tar" as an illuminant.

About forty years elapsed, however, before Kier achieved success and, as Mr. Victor Ross states, evolved a burning fluid which "attained some vogue in rivalry to a kerosene which was being extracted from oil-shales in the Province of New Brunswick." Whatever of groundwork is justly attributable to Dr. Young and Chemist Kier, out of the "Devil's Tar" of Virginia

and the "Coal Oil" later on derived from Albert County, New Brunswick, was devised practical processes for the refining and marketing of crude petroleum. Without those "foundations," as Mr. Ross points out, the decision to test the ground at Titusville, Pennsylvania, in 1859, by means of boring and pumping would not have been so adversely momentous to the New Brunswick shale industry. While Bissell and Drake, encouraged by Professor B. Silliman, of New Haven, were grappling "with the problem of extracting from the crude a safe burning oil end eliminating the offensive odour," it was Dr. Abram Gesner who antedated them by investigating the New Brunswick shales about eight years before Drake's discoveries at Titusville "benefitted mankind, stimulated mechanic arts, enlarged the pharmacopoeias" so that the 2,000 barrels of crude oil produced in Pennsylvania in 1859 rose to 4,215,000 barrels in 1869.

Drake's drilling apparatus and efforts were the joke of the day. Dr. Gesner's distilling plant at Baltimore—now Rosedale—in New Brunswick, evoked ridicule and amusement. Gesner produced and refined "coal oil" at Baltimore, and was the pioneer in this respect. The part he played has been scantily recognized. He lectured throughout New Brunswick on his new lighting-fluid, and it is worthy of emphasis that Gesner's illuminant entered into competition with that recovered from "The Devil's Tar." Nor was the Gesner Baltimore distilling-plant permitted to monopolize the field. "Albertite Coal" was found near Hillsboro, where mining started. A considerable quantity was shipped to the Downer Oil Company, of Boston, for distillation into oil and for use in the manufacture of gas.

Mr. Lodge, five years ago, recited those developments. New Brunswick was a prime factor, therefore, in the initial stages of the oil industry on this continent. Mr. Charles Archibald, of Halifax, Mr. Harding, of St. John, and others, under the guidance of Scotch engineers, also are credited with having operated a retorting plant at Baltimore. The shales and the "Albertite" were appreciated for their unique contents. Americans welcomed "coal oil," paraffin-wax candles, whatever enriched the gas being manufactured in those days.

For the time Baltimore and Hillsboro were to the fore. Albert Mines were an industrial center of some note. Even after natural oil was discovered in Pennsylvania, for a year or two interest in the New Brunswick areas did not wane. The Downer Oil Company, of Boston, headed by Mr. Merrill, Professor Carroll and Louis J. Emery, of Bradford, Pennsylvania, the latter being the scene of important oil developments, busied themselves and undertook to drill St. Joseph, Memramcook and Dover localities. Events in Pennsylvania, the seepages noted in New Brunswick, made adventurers all the keener, but while the upper oil and gas-sands were tapped and were somewhat encouraging they were insufficiently so to withstand the more glamorous Pennsylvanian fields.

Eventually Dr. Gesner and his contemporaries vanished from Baltimore and Hillsboro. Here and there New Brunswickers tried out their country, but New Brunswick's "Albertite," "Coalite" and "Cannel Coal" were "unhonored and unsung," though not "unwept," for nearly forty years thereafter, despite periodic pronouncements that oil would be discovered in commercial quantities. Fluid oil had priority. It was not material that Professor Shaler, of Harvard University, twenty years ago sagely declared with regard to oil that "the sources of supply are waning, and no important new fields have been discovered of late. The search for petroleum has always to be undertaken with a chance of failure."

It took New Brunswick twenty-seven or eight years to think it over. Meanwhile and in the face of Professor Shaler's apprehensions, the United States annual oil production attained to a grand total of nearly 400,000,000 barrels, irrespective of importation. Yet there are those in New Brunswick who accept the estimate of distinguished scientists who represented the Imperial Government in 1914, that there is a possible 4,950,000,000 Imperial gallons of crude oil in one section of the New Brunswick shales. As the shales are said to extend over a longitudinal distance of thirty-six miles, the others than the section quoted by the scientists need not be so strong to put the Albert series upon the oil maps—provided there is adequate profit in the mining, distilling and marketing operations. The 9,000,000,000 lbs. of sulphate of ammonia alloted by the same scientists to this particular section of the shales may constitute a supply that will obviate a shortage.

Since those estimates were recorded further drilling confirmed the confidence of the vendors and the present holders of the shale-bearing areas for which New Brunswick contentedly stipulated a yearly rental of $300, and a royalty of 10 cents a ton after an expenditure of at least $100,000. Desultory years intervened. The province was more prolific in periodic promotions than in production, what money was raised being more on personal account. Lessees in general held areas. Most of those areas were comparatively small and what proof there was as to oil and gas was unimpressive to outside capital. Eventually, however, Mr. Lodge, of Moncton, and associates, decided to seek a concession. They broadened their horizon sufficiently to cover 10,000 square miles and appealed to Premier H. R. Emmerson, who secured expert advice and subsequently was instrumental in putting through an Order-in-Council granting the concession to explore for oil and gas.

The creation of the New Brunswick Petroleum Company in 1899, the identification of the late Hon. B. F. Pearson with the development, the advent of the first drilling rig in 1901 on the farm of Ralph Steeves at Upper Dover, are matters of somewhat forgotten history. Mr. Pearson and Professor Shaler together with Professor Gooderich, lent the weight of their fiscal and professional influence. They urged upon officers of the New Brunswick Petroleum Co that they were "decidedly of the opinion that the field is one eminently fit for exploration, and that the chance for finding oil and gas is extremely good."

The "decided" optimism voiced by Professor Shaler failed of effect other than to promote spasmodic effort. Premier Emmerson, of New Brunswick, enthused. Other countries, including Canada, availed of the Pennsylvania developments. Ontario became a prodneer Roumania led off with "hand dug" wells and at the outbreak of the Great War was yielding 11,000,000 barrels of crude petroleum annually. Russia preceded all countries and in fifty years contributed 1,650,000,000 barrels, the main part, as Mr. Victor Ross states, from an area of about 4000 acres in the Baku district.

Before New Brunswick sought expert counsel in 1893, Russia had drilled nearly 500 wells, and Pennsylvania then ceased to attain to its maximum produc

tion of 35,839,777 barrels in 1891. Emphasis need not be laid upon discoveries of oil throughout the States, Mexico, South America, the West Indies, Europe and Asia. Apart from Ontario, Eastern Canadian areas continued unexploited. Professor Shaler in 1903 advocated a drilling programme to test the deeper sands "west from the Petitcodiac River, elsewhere than at St. Joseph's and Weldon" where, he was confident there was oil and gas, a forecast that was verified somewhat seven years afterward.

Oil shales were not entertained. It is alleged the New Brunswick Petroleum Company, Ltd., which blanketed the country with their concession, to 1905 had expended "some $250,000 in development work." How that much could be distributed without having more to show for it, unless the acquisition of ground and investigations made were costly, it not clear. Oil and gas undoubtedly were located, but it was not until January, 1909, that an arrangement was effected with what became the Maritime Oilfields, Ltd., which took the working option on the concessions, the stipulation being that they had the right to search for fluid-oil and gas.

This company, under the management of Dr. J. A. Leo Henderson, whose father and family were outstanding factors in South Africa, found large quantities of gas, but insufficient oil, so a contract was made with Mr. T. N. Barnsdall, of Pittsburg. The Barnsdall Company organized the Moncton Tramways, Electricity and Gas Company, to serve with gas Moncton and other cities. This Barnsdall Company expended about a million dollars in piping and plant, and supplied Moncton City, its suburbs, and Hillsboro, with gas for lighting and power.

If the million or so expended by the Barnsdall people, the $250,000 spent by a preceding company, and other amounts, be lumped, the return upon capital to the New Brunswick Gas and Oilfields, the successor of the New Brunswick Petroleum Company, and the Maritime Oilfields, Ltd., which were merged, has not been commensurate. Unless the promoters reimbursed themselves, shareholders had no reason to further invest in the exploitation of prospective oil areas or the shales.

This has not deterred the company from persistently endeavoring to maintain the supply of gas, and also to locate oil. Mr. Lodge has chronicled it (in 1917) to be a fact that "several billions of cubic feet of gas have been supplied to the manufacturers and householders for heat, light and power." In the year 1916 there was consumed in the City of Moncton 599,454,000 cu. ft. of gas, at a rate of 25 to 38 cents per thousand cubic feet, a boon to those benefited during the "profiteering" period. Moncton's prosperity coincides with this supply of gas and the advent of railway terminals and factories. For this gas the province receives a royalty of 5 per cent of the value. Speaking for the Canadian Government Railways, in 1913, General Manager Gutelius figured the cost of natural gas used for their engines, at an average cost of $1·17 per horse power per month. With this economy in effect, the impetus and convenience provided throughout by the gas; and the income however small accruing to the province, patient shareholders experienced "the slings and arrows of outrageous fortune." In recent years encouragement was met with in finding a little oil—1920 being the record year in this respect with a production of 714,827 gallons of crude—the daily average of the whole province being given by the Dominion Statistician as slightly over 14 barrels, a somewhat tantalizing quantity. Nevertheless the finding of gas and indications of oil kept on view the larger possibilities, not only in natural oil but in regard to the shales. Owing to non-success in bringing in sufficient additional gas wells the supply is being mainly restricted to households.

The chief actors in those tortuous years saw the curtain rung down upon their performances, in everything other than bulk production of gas and a trifling amount of oil. Scientists did not convince capital New Brunswick shales were opportune. "Production is only kept up by the work of the 'wildcatter.'" Mr. Victor Ross wrote. Natural oil became the vogue; the "wildcatter" became omnipresent; to the end of last year the world had produced nearly as much oil as it is estimated there is remaining in known petroliferous strata—but the extraction of oil and recovery of the other contents of oil-shales continued to be economically out of it. Even now there is a doubt. Authorities declare results from the shales are contingent upon the world's necessities and cheap labor. It is not disputed that the shales will be an industrial refuge. Ultimately not only the oil but the contained sulphate of ammonia are admittedly important — if economically available.

War prices for oils and the rate of consumption of natural oils, finally induced the Washington Government to bestir themselves and determine the quality and extent of the Colorado, Utah, Wyoming and Nevada shales. In this respect, Washington followed the lead of the Imperial Government upon the initiative of Messrs. Lodge and Sir William Mackenzie who sponsored the New Brunswick shales. Concurrently the Hon. W. G. Pugsley and Senator Domville, owning a smaller area known as Albert Mines, or Oil Shales Company, Ltd., made a demonstration in 1918 through a local fuel administrator by shipping free of cost other than a freight charge, 100 tons of their shales, the owners imposing the reservation that the provincial royalty of 10 cents per chaldron of 2,856 lbs. be waived. Of this novel test, the report of the New Brunswick Crown Land Department said:

"It was found to make a hot fire, the oil embedded in the shale forming a brilliant and cheerful flame, and thus rendering it adaptable for use in an open grate. The only drawback was the excessive quantity of residue remaining after the oil was consumed. This drawback was largely overcome by the use of dump grates. Resulting upon this experiment a spur of nearly half a mile in length from the Harvey-Salisbury Branch of the Government Railways has been constructed, and a seam of oil-shale has been opened up in the hillside close to the track, from which several hundred tons have already been mined. The Department is informed that the shale taken from this seam is rich in oil, average samples yielding close to 60 Imperial gallons of oil to the ton, or about double the richness of the oil shales of Scotland, from which the distillation of oil has been carried on successfully for many years. While the use of the oil shale for fuel to help meet the present fuel emergency situation, may in some degree realize the results hoped for, it is also expected that the very general attention which has been called to the richness of the shale in oil — while it is also known to contain a large percentage of nitrogen, useful as fertilizer in the form of sulphate of ammonia — will result in the early establishment of a plant for the distillation of oil, and the production of sulphate of ammonia and other by-products. . . . Already capitalists in the United States are starting in to develop the oil shales; a score of experts are engaged in designing retorts for distillation of oil, which it is claimed will improve upon the retorts in use in Scotland and render the plants better adapted to treating the shales of the United States, which, like the shales of New Brunswick, owing to their greater richness will, it is claimed, require a somewhat different treatment

than the Scotch Shales. . . . It may, as stated above we think safely be said that the time is now nearly at hand when a great and successful shale-oil industry will be esablished in this Province."

That was officially written of the same shales Dr. Gesner had worked in 1851, and ten years after Lodge and his New Brunswick colleagues—subsequently joined by Sir William—concluded that those shales had potential value, their lateral extent of 36 miles in Albert, Kings and Westmoreland Counties promising quantity if quality was persistent.

Governor Pugsley also concluded to have a bulk test made of his shales; so he had 161·5 lbs. shipped from "an opening on seam No. 1, on Frederick Brook, Albert Mines," represented "as a fair sample of the seam," to W. G. Wallace, superintendent of the St. Clair Gas Company, of East St. Louis, Illinois, who had successfully experimented with and patented methods for carbonizing coal and restoring shales. Dr. Haanel, of the Ottawa Mines Department, superintended that test, and he reported:

"The total quantity of shale received at the laboratory of the St. Clair Gas Company, was 151.5 lbs. and this was divided into two lots, 81.5 and 80 lbs. each, which were retorted in two separate tests.

"The recoveries obtained were as follows:

Test One:

Summary of Results.		Per Ton of Shale.	
Shale Charged	Lbs. 81.5		
Oil Recovered	13.6	43	U. S. Gallons
Gas	Cu. Ft. 175	4290	Cu. Ft
Spent Shale	Lbs. 52.15	1297	Lbs.

The oil recovered, viz., 13 lbs 6 ozs., contained a small quantity of water which was not determined. The calorific value of the gas produced also was not determined

Test Two.

Summary of Results	Per Ton of Shale
Shale Charged, 80 lbs.	
Oil Recovered, 11 lbs. 14 ozs.	39.6 U. S. gallons

A leak developed during this run, hence the lower recovery

Those results are quoted because they relate to the solitary shale-bearing acreage of any consequence, so far as I have ascertained, that was not included in the approximately 190 square miles incorporated in the "Albertite, Coalite and Cannel Coal Company, Ltd.," in 1907. Prior to this concession, the broader grant was made covering 10,000 square miles, practically the whole eastern section of New Brunswick, conveying the right to seek natural oil and gas, no reference being made to the shales. Messrs. Lodge and associates obtained a practical monopoly of the shales, upon lenient conditions and terms, for 100 years. The Pugsley Domville smaller area Oil Shales Company of Canada, now, was leased under what is known as the Old Act, and these latter lessees without doing much, and without being called on to do much, simply have to pay a royalty of 10 cents per chaldron, after 6 per cent has been earned on the company's capital. Virtually perpetual the lease brought the holders of it nothing further than occasional effort and non-success in inducing capital to satisfy some of the vendors and take all the risk entailed in attempting to establish an oil shale industry. Early in this year, actually on February 22, one drill hole was completed by the owners of this lease and their friends. It was stopped at a depth of over a thousand feet, without penetrating through the shale series, and this is the log of that hole:

Rock Borehole No. 1.	Color and General Character	Thickness Bored Feet	Total Depth from Surface Feet
Loose Gravel		24	24
Soft Shale	Light Blue	10	34
Soft Blue Shale	Thin Bands	3	37
Soft Blue Shale	Gummy	[illegible]	58
Soft Blue Shale	Gummy	35	[illegible]
Oil Shale	Brown and Grey	[illegible]	[illegible]
Slate	Soft	[illegible]	[illegible]
Oil Shale with Thin Layers of Slate		[illegible]	[illegible]
Soft Slate with Thin Layers of Oil Shale		[illegible]	[illegible]
Oil Shale	Brown	[illegible]	143
Oil Shale	Dark Brown	20	163
Oil Shale	Dark Brown	22	[illegible]
Oil Shale	Dark Brown	10	196
Oil Shale	Dark Brown	20	[illegible]
Oil Shale	Dark Brown	23	238
Oil Shale and Slate		22	260
Slate	Grey and Blue	27	287
Oil Shale	in Thin Layers	[illegible]	[illegible]
Oil Shale		[illegible]	[illegible]
Oil Shale		[illegible]	[illegible]
Oil Shale		20	[illegible]
Oil Shale		20	[illegible]
Oil Shale		20	[illegible]
Oil Shale		20	[illegible]
Oil Shale	Slaty	[illegible]	447
Oil Shale with Thin Bands of Slate		[illegible]	[illegible]
Oil Shale	Slaty	[illegible]	[illegible]
Oil Shale	Light Brown	16	506
Oil Shale	Light Brown	12	518
Oil Shale	Light Brown	[illegible]	538
Oil Shale	Brown	[illegible]	560
Oil Shale	Light Brown	[illegible]	583
Oil Shale	Light Brown	[illegible]	603
Oil Shale	Brown	[illegible]	628
Oil Shale	Light Brown	[illegible]	650
Oil Shale	Bands of Slate	20	670
Oil Shale	Bands of Slate	18	688
Oil Shale	Light Brown	12	700
Oil Shale	Light Brown	[illegible]	[illegible]
Oil Shale	Light Brown	[illegible]	752
Oil Shale	Light Brown	22	774
Oil Shale	Light Brown	20	794
Oil Shale	Light Brown	24	818
Oil Shale with Bands of Slate		23	841
Oil Shale	Slaty	21	862
Oil Shale	Slaty	22	884
Oil Shale	Light Brown	15	899
Oil Shale	Light Brown	[illegible]	916
Oil Shale	Light Brown	18	934
Oil Shale	Light Brown	[illegible]	956
Oil Shale	Light Brown	21	977
Oil Shale	Light Brown	[illegible]	[illegible]
Oil Shale	Light Brown	[illegible]	[illegible]

Note.—At 700 ft. to 710 ft. [illegible] found on the water.

At 923 ft. to [illegible] [illegible] the water [illegible] half a pint [illegible].

[illegible] stopped [illegible]

Maybe this is the first time a complete [illegible] for this depth has been submitted for publication. The log by no means represents the depth of the Albert Series although it will suffice. The [illegible] concession for fourteen years [illegible] 1907, with the right of renewals, by the "Albertite, Coalite and Cannel Coal" Company [illegible] in view of the [illegible] 190 square miles [illegible]. Messrs. Lodge, [illegible] and [illegible] New Brunswick Gas and Oil [illegible] notwithstanding the 190 square miles [illegible] of their 10,000 square mile grant.

What properly ought to [illegible] the Lodge [illegible] interest [illegible] 800 acres [illegible] heart-breaking [illegible]

tertain the further proposal that $100,000 be expended by them in a stated period, and ultimately to pay 10 cents a ton on shale mined.

Recently it was alleged the concessionaires might not have fully complied with the provisions of the concession. The concessionaires were sustained by the Provincial Government, however. They had been in possession so long, had repeatedly endeavored to impress upon capital the worth of the shales, and if they had not succeeded until recently the Provincial Government felt the holding company was fortified. It has not been for lack of effort that large operations were deferred. Hardly a year elapsed after the concession was obtained before Mr. Lodge made a trial shipment, of which he tells this story:

"In 1908 about 45 tons of the Shales from the property of the company were shipped to Scotland where they were retorted in the regular way under ordinary working conditions, and refined by one of the most successful Scotch Shale Companies, under the supervision of a capable official representing the Government of the Dominion of Canada. An official report of this practical test, which also thoroughly describes the Scotch Shale Industry, was published by the Government.

"It is established by that Government Report:

"(A) That the New Brunswick Shales contained an average of 40 Imperial gallons of crude oil, equal to 48 U.S. gallons, and 77 pounds of sulphate of ammonia per long ton of shale, and that such results were eminently satisfactory, and exceeded the values of the greater part of the Scotch Shales which had been worked for years.

"In his evidence, 1908, before the Committee of the Honorable Senate of Canada, Dr. Ells, the reporting official declared that,

"'In Scotland they are working in oil shales that went from 15 to 25 gallons of oil and 40 to 50 pounds of sulphate of ammonia per ton. Our shale was far ahead of anything we saw there.'

"(B) That the refined products of the crude oil obtained from the New Brunswick Shales worked out, according to two methods of refining, as follows:

Method A.

Products	Gallons per 100 gal. of Crude Oil	Specific Gravity 60 deg. F.	Setting Point Deg. F.	Melting Point Deg. F.
Heavy Naphtha	1.62	0.7670		
Burning Oil	10.04	0.7954		
Gas Oil	14.78	0.8431	25	
Cleaning Oil	2.83	0.8713	25	
Lubricating Oil	9.58	0.8957	30	
Crude Wax	2.26			112.26
" "	0.93			101.00
Residium from blue oil (refined)	0.28			
Residium from treated crude distillate	1.27			
	43.48			

Method B.

Products	Gallons per 100 gal. of Crude Oil	Specific Gravity 60 deg. F.	Setting Point Deg. F.	Melting Point Deg. F.
Heavy Naphtha	1.45	0.7670		
Burning Oil	11.50	0.7955		
Gas Oil	13.04	0.8450	25	
Cleaning Oil	1.56	0.8705	25	
Lubricating Oil	11.03	0.8935	30	
Crude Wax	2.21			113.30
" "	0.60			104.00
" "	0.16			84.00
Residium from blue oil refined	0.57			
Residium from treated crude distillate	1.95			
	47.07			

(See "Oil Shales" Ells Geological Survey Reports 55 and 1107, published 1909.)

Whatever disparities exist between the test made at East St. Louis in 1918 by the Wallace Process and that of 1908 by the established Scotch Process, the average of about 40 United States gallons per ton of shale is claimed by the promoters. Dr. R. W. Ells, of the Dominion Geological Survey, officially supervised this test in behalf of the Ottawa Government, and Dr. Charles Baskerville, of the New York City University, acted on behalf of the owners of the shale. They also reported a sulphate of ammonia content of 76·94 lbs. to the ton of shale. Nor did the determinations end there. Dr. Ells made others and obtained higher results in oil and sulphate of ammonia. More tests by Dr. Griffiths, of New York, corroborated the Ells-Baskerville data. Mr. W. A. Hamer further tested the shales in the laboratory of the New York University, under the direction of Dr. Baskerville, and reported upon samples selected from seven localities a yield of crude oil varying from 35 to 65 United States gallons, and ammonium-sulphate varying from 75 to 110 pounds per ton of shale.

Presumably the analyses were obtained upon outcropping shales. Had it not been for discoveries of natural oil they might have aroused sympathetic capital. All the eloquence and facts at the command of the promoters, though, could not divert sufficient funds to prove the payability of these shales, or shales anywhere.

Immediately prior to the Great War, Mr. Lodge proceeded to London where, after months of solicitation and negotiation, he induced the Anglo-Persian Oil Company, in which the Imperial Government are said to have a controlling interest, to consider the shales as an all-British proposition. Accordingly Sir Boverton Redwood, then chief adviser in oil matters to the Imperial Government, took up the subject. In 1914 he reported that, under instructions:

"I caused a geological survey to be made by my colleague, John E. Marshall Hall, A.R.S.M., F.G.S., of an oil-shale area of 190 square miles, situated in the counties of Albert Kings, and Westmoreland, New Brunswick.

"It will be seen from the subjoined report that Mr. Marshall Hall, after a prolonged and careful study of the available data, estimated the minimum quantity of readily accessible shale at 145 to 150 million tons, much of which he states, can be mined by the use of the steam shovel.

"The evidence upon which the above estimate is based is set forth so fully in his report that there is no room for doubt as to there being in the area described a deposit of oil-shale of immense magnitude, and as the geographical position of the property is exceptionally favorable in respect to transport facilities it only remains to be shown that the shale is of good quality.

"It will be noted that an unusually large number of representative samples were taken over the whole area traversed. These samples, which I received direct from Mr. Marshall Hall, have all been analyzed in my laboratory . . . "The analytical and practical results collectively demonstrate that the shale is of high quality as a source of the products obtainable from such mineral. On the whole, therefore, I submit that the acquisition and working of this property would furnish an attractive opportunity for the establishment of a lucrative industry of great industrial importance."

Sir Boverton adverted to 21 "representative" samples dealt with by destructive distillation at low temperature. They showed an average oil content of 32·7 Imperial gallons of oil per long ton of shale, equal to 39·24 U.S. gallons. Sir Boverton also gave the chemical results of fractional distillation tests of crude oil, from which it appears that, taking his lowest results obtained, the following percentages of refined and by-

products might be expected per 100 gallons of crude oil:

"Naphtha, 12.5 gals., less 5 per cent for possible wastage in refining.
"Burning oils, 46.5 gals., less 5 per cent for possible wastage in refining.
"Lubricating oil, 10 gals.
"Fuel oil, 10 gals.
Paraffin wax, 4 per cent.
"Coke, 2 per cent."

It was upon the recommendations of Sir Boverton and his staff that the Anglo-Persian Oil Company entered into the agreement which has continued through and since the war, the D'Arcy Exploration Company being in charge of operations. Periodically the semi-official Imperial factors have not seen eye-to-eye with the Canadian promoters. That there was tonnage—and quality insofar as indications and tests disclosed—never has been questioned—but the allied nations, especially the United States, removed the necessity for further Imperial Government operations, particularly when war costs weighed too heavily and war funds had more essential developments to reach for, notwithstanding drilling, left no doubt as to the "immense magnitude" of the deposit. As to the vendor consideration in the transaction, the understanding always has been that it is largely in shares when issued, little cash being forthcoming.

Engineers familiar with such occurrences and with the records of Scottish shale companies, went into the New Brunswick situation thoroughly and slowly. Owing to the war, inevitably the probationary period was tediously prolonged. All told, however, some 17,000 feet of drilling has been done—more holes are going down—and processes for the most economical treatment of the shales have received attention. What are the average contents of the entire cores obtained in drilling has not been divulged. The success of the enterprise depends upon low costs, the quality of the shales with a great tonnage going through the crushers and retorts, and the prices obtaining for the varied products.

The Anglo-Persian Company are alleged to have allocated over $6,000,000 for New Brunswick purposes, all of that much will be needed. Perhaps this newspaper report is wide of the mark. It is said $12,000,000 will be needed. Thus far, to the end of last year, the Anglo-Persian expenditure was $417,000. Since then the technical staff has been enlarged and a testing plant started at Rosedale a month ago, Mr. Wallace being on the work, his process having been adopted.

The daily capacity of the plant is eight tons, and the material as taken from the several surface workings is crushed to egg-size. The viscosity of the shales makes it somewhat difficult to crush finer than this. Naturally there is disinclination to discuss results being obtained. Satisfaction with them is expressed. A 5,000-ton plant is talked of. In that event, should the Red wood average yield of 32.7 Imperial gallons of crude oil per ton of shale be sustained, such a plant working continuously may produce about 60,000,000 gallons per annum. With a paraffin base such oil should command a market. One authority declared there is enough shales assured in the series to supply five plants of 1,500 tons capacity each for fifty years.

An approximate estimate of the per-ton cost of mining, manufacturing and refining with a 1,500 ton plant, put it at $1.7518, and pre-war prices for oils, gasolene and ammonia were taken. That was before the war. So many contingencies enter into such operations that strict injunctions have been given against any and all publicity. Calculating on the pre-War basis, London was petitioned upon the assumption that a 1,500 ton plant dealing with 547,000 tons—working day and night—would provide a gross revenue of $2,198,455, a minor fraction more than $4 per ton. With improved recovery of gasolene from the gases carried over in the distillation of the shales, a further $248,000 was deemed possible. That would bring the gross revenue to about $4.50 per ton.

Obviously, therefore, these shales are not for "fly-by-night" operators. Plants, a railway, marketing facilities, efficient mining and perfect mechanisms, at once preclude small capitalists while increasing the interest in what those who are financing the enterprise are doing. Capital outlay, though, is going to require the utmost economy throughout, and satisfactory markets for the products. That is why the Anglo-Persian-D'Arcy Exploration people made haste slowly. While providing the eight-ton test plant now in operation they laid concrete foundations for a larger installation to follow. A commendable policy adopted is that as much as possible of the plant as and when required will be constructed in the Maritime Provinces.

Should the greater project attain to fruition and huge tonnages of oil-shales become commercially profitable through larger plants deemed possible, similar occurrences in other countries may commend themselves to capital that is willing to take the risk. Some time will elapse before great units can be made and assembled, but the fact that the Robb Engineering works are employed upon retorts suggests a description of the Wallace refining process, as taken from the application for Canadian patent. This process "is applicable to the distillation, carbonization or vapourization of all coals, lignites, woods, oil shales and carbonaceous substances, and while various kinds of apparatus can be used in practising" the process, it is urged that "an apparatus be used which is equipped with a heated distilling-chamber, a perforated take-off duct constructed and arranged inside of the distilling-chamber in such a manner that it eliminates the possibility of the evolved gases, vapours and oils contacting with the hot walls of the chamber in escaping therefrom, and also insures the recovery and immediate removal from the distilling apparatus of all of the oils and liquids evolved in the distilling operation."

PERSONALS.

Directors of Wright Hargreaves were at Kirkland Lake last week when the first clean up was made at the mill.

Mr. E. H. Orser has opened an office at Kirkland Lake. Mr. Orser was for some time geologist for the International Nickel Company.

Directors of Ontario Kirkland Mining Company visited the property last week.

Mr. H. Stevens of the Hollinger staff has a party of twenty men surveying the Company's recently acquired water power—the Long Sault rapids on Mattabi River.

Mr. R. E. Hore has returned to Toronto after visiting the gold mines at Porcupine and Kirkland Lake for the Canadian Mining Journal.

Mr. A. G. Burrows and Mr. P. E. Hopkins of the Department of Mines, Ontario have completed a survey of Skead township.

The Ontario Mining Association meets in Cobalt on June 16.

Ironstone Mining in North Lincolnshire. England

By ROLAND H. BRIGGS, Coulsdon, Surrey.

The ironstone mining of North Lincolnshire is of increasing importance. Sixty years ago the output was only 16,000 tons per annum, by 1870 it had risen to 217,000 tons, by 1910 to 1,800,000 tons, and by 1920 to 2,400,000 tons. The iron content is low, but the ease with which the most modern mechanical methods can be applied to getting it, makes it worthy of the most thorough exploitation, and in addition its chemical constituents make it peculiarly valuable. Frodingham ironstone nearly always contains sufficient lime to enable it to be fluxed without the addition of limestone, and as it also contains about 1 per cent. of manganese, the addition of manganese ore in smelting is also unnecessary.

The first ore was quarried in 1859, and five years later the first of the local furnaces were erected for the smelting of the ore. The replacement system of mining which is carried out calls for careful organisation and operation, and in the early days much of the bottom stone was left where it was, but with modern scientific methods the whole of the bed is everywhere mined and all faces worked to their full depth.

The ironstones of Britain are found in the Jurassic rocks which stretch in a broad band across country from the coast of Yorkshire to the coast of Dorset. The ironstones occur in four different geological horizons. Some ironstone is also found in the Kent coalfield. In 1917 eighty per cent of the total native output of iron ore was found in the Jurassic rocks, the remaining 20 per cent being hematite from Cumberland and Lancashire and elsewhere, and blackband ironstone from the coal-fields.

In pre-war days cheap water-transport made it possible to import high-grade foreign ore, which contained fifty per cent of iron, but during the war it was necessary to fall back very largely on the native ironstone. These ores average about 28 per cent in iron content, and have a high phosphorous and sulphur percentage, and are generally rather siliceous. As the metallurgical treatment of these ores is different, basic-lined steel furnaces had to be substituted as rapidly as possible for the acid type. The magnesite bricks were made from material obtained from Greece and Madras, and new quarries were opened to furnish the dolomite and limestone required. The total production of iron ore in Britain is about fifteen to sixteen million tons per annum.

Mechanical methods of ore-getting in north Lincolnshire were not very quickly introduced, owing to the ease with which the ore could be obtained near the outcrop, but as the workings developed, grab-cranes were brought into action, and these proved a great improvement on hand methods. By 1905, however, the shipping had become deeper, and chain bucket-excavators were then introduced, and proved a great advance on the grab cranes, but later on these were also superseded by costly but most efficient equipment, which has reduced working costs in a remarkable degree.

The long-jib crane type of steam shovel has also become popular in the district, different types being at work which dump at a distance of 60 feet and 75 feet

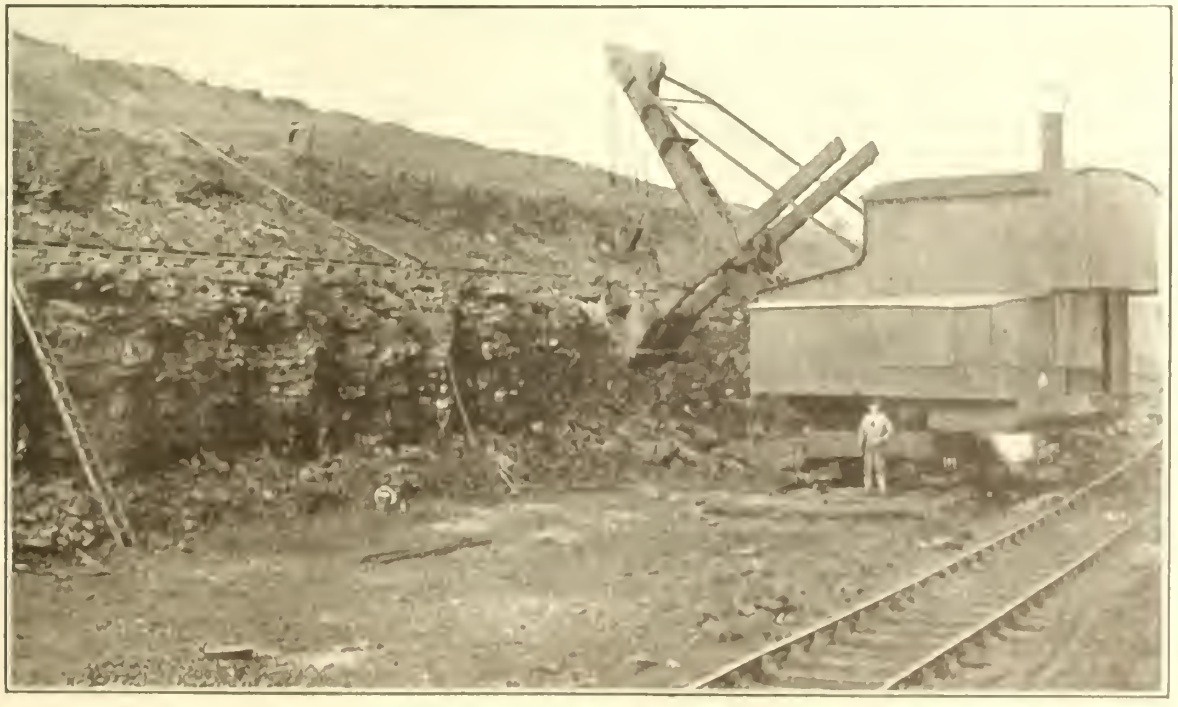
Stripping the Frodingham Iron-Ore Bed.

Stripping Operations—Frodingham Iron-Ore Bed.

respectively, and when a greater distance is required, as for instance when the stripping has reached thirty feet deep, a transporter can be used in conjunction with the 60 foot machine, giving a total dumping distance for the excavated material of 120 feet or even more.

Two types of machines are being used to deal with the Frodingham bed, and the first of these has amply demonstrated its ability to deal with faces up to 16 feet in depth. The second and much larger machine was specially designed to deal with the full thickness of the Frodingham bed, which it does very effectively. Experiments are being made to show whether the smaller machine will work the full depth of stone, by fitting it with a longer jib, and as the smaller machines are much less expensive in first cost, they will probably be the type regularly installed if they will successfully handle the greater thickness.

The actual average filling rates of these machines, taken over a period of several months, are 130 tons per hour for the smaller machine, and 186 tons per hour for the larger machine, but it should be understood that the daily total does not work out on the averages, as



Loading from the Frodingham Iron-Ore Bed

considerable time is lost by stoppages caused by changing cars, coaling, lubricating and minor breakdowns.

The successful use of these mechanical appliances does not depend alone on the efficiency of the machinery or on the care with which it is operated. It also depends very greatly on the skill with which the blasting of the ironstone has been carried out. It was at first considered doubtful whether it was possible for the ironstone to be reduced to such limits as would be satisfactory for the blast furnace, but it has since been shown that if the drilling is carried out judiciously and the explosive used in considerable quantities, the results obtained are to the entire satisfaction of all concerned.

The drilling in most of the faces is carried out by hand machines driven by compressed air. The hole is staged down so as to finish at a diameter of 1 7/8 inch., and these are drilled every 8 or 9 feet, so that sufficient explosive can be used to shatter and distintegrate the ironstone satisfactorily.

In one of the deep faces a machine is used by means of which a hole 6 in. in diameter can be drilled. These holes are spaced at much greater intervals and carry a very powerful charge. The cost of drilling and explosive with this type of machine slightly exceeds the cost of the method in which the smaller holes at shorter intervals are used.

It will be understood that the mechanical equipment of the ironstone mines of North Lincolnshire does not end with the excavating plant for the actual getting of the ore. The mines are complete with up-to-date power-houses, railways, locomotives and rolling stock, air compressors, and other machinery, which enable this area to make so considerable a contribution to the iron-ore supplies of Britain.

In conclusion the writer wishes to express his thanks to Mr. R. E. Westwood, the Manager of the Frodingham Ironstones Mines Ltd., for his valuable assistance in the preparation of this article.

MINING IN MANITOBA.

CHARLES A. BRAMBLE.

Some may say that such a heading as the above recalls the famous chapter on snakes in Ireland, which read "There are no snakes in Ireland." But, with all due respect to those who doubt—there really is in this province that which—without undue exaggeration—may be written of as mining. Indeed the situation looks somewhat more encouraging than it has ever looked. On the Oiseau some remarkable copper and nickel-ores have been uncovered, apparently in bodies capable of yielding a great tonnage. These claims are in strong hands and are being thoroughly tested. Seeing that samples at 20 feet, run 25 percent copper, at one end of the 5,000 feet of outcropping, and five per-cent of nickel at the other end of it, and that the discoveries were made within ten miles of a railway, and of the Point du Bois power plant, it is permissable to predict that sooner or later there will be something doing in this particular locality.

The holders of these locations, have, as has been intimated, plenty of capital, and are going ahead quietly but steadily, the work being done by a reputable contractor, directed by one of the most eminent engineers we have in the Dominion. It is to be expected that within the next few years the moose, caribou and deer, as well as the bear and lesser forest creatures, will have to make room for the locomotive, the smelter, and the townsite.

If these discoveries were "developed" as so many Manitoba properties have been "developed," the daily press would carry many a full-page advertisement, written by some broker, in exuberant language. Happily for Manitoba these latest accessions to our ranks are endeavouring to mine ore, not to mine the public.

Spectacular finds of rich gold-quartz continue to be reported from the Rice Lake field, but the big, promising, bodies of comparatively low-grade quartz are not not being worked—as yet. These are not good stock sellers, so they must await the time when a railway up the east side of Lake Winnipeg shall permit the real mining operator to get a look in. But there are a few quiet, reserved, prospectors developing claims in the neighborhood of Hole River, mostly on the northern side, of which rumour has a lot to say. It is whispered —through a megaphone—that one or two of them have made important discoveries: discoveries that the discoverers have spoken of merely to their backers, and as these bankers dwell south of the boundary line not much can be ascertained by the local amateur detectives. This, of course, furnishes an added motive for decorative details, so that the famous "Lost Cabin" mine yarn seems by comparison poor and insipid. Joking apart, there is much promise in the Hole River district. Here too is situated the Bellevue Group, of which the Luleo is the king pin. This property has had a chequered career, but on July 1st., it is understood things are to begin to happen. The persons who foreclosed on the property a year ago are said to contemplate serious development. As they have a 20-stamp mill on the property, almost in condition to crush, and a certain amount of underground work finished, a year's steady drilling should put the property in shape for producing. It will, possibly, not be a high-grade mine, yet there ought to be a satisfactory margin of profit. Moreover it should give tonnage.

Winnipeg is keeping its head level and its pocket closed as regards oil, frightful tales having been told of the happenings in Calgary some few years ago; also times are hard, and after the butcher, baker and, far worse, the grasping landlord, have been—not of course satisfied, but temporarily appeased and quieted—there is not any vast amount of loose money lying around. Nevertheless, drilling is going on at several spots, and one well, at least, at a depth of 1,000 feet, gives more than a sniff of petroleum. It may well be that we shall not have to go quite to Fort Norman for oil. Those who know the history of the Mid-Continent oil-field will perceive that a short distance west of our outcropping Devonian there should be a good chance of finding oil at depth. Only our folk will have to think in terms of thousands instead of hundreds of feet. If brother Jonathan can go to four and even five thousand feet, why are our holes to be limited to one or two thousand? True we have no Carboniferous strata, such as the Mid-Continent boasts, but though we lack the Pennsylvanian series, which has yielded so richly in the South, our Devonian and Lower Cretaceous may turn out to be worth attention, especially if tested well away from the outcrops.

Northern Ontario Letter

THE SILVER MINES.

Arrangements have been completed to hold the annual meeting of the Ontario Mining Association in Cobalt on June 16, 17 and 18th. The association has a company membership of forty-one, each of which is represented by one member and, in some cases two, in the person or persons of the manager and assistant manager. In addition to the general invitation to these 41 company members, there are 36 specially invited guests on the list as it appears at this date. Of these specially invited guests, twenty are identified as officials of the mine or company belonging to the association, while the remaining sixteen are made up of eight from Toronto three of whom are identified with mining companies operating in the province and five being connected with the Ontario Department of Mines, the other eight guests being invited from Cobalt, Haileybury, New Liskeard and Porcupine. The total attendance will probably be about one hundred.

In addition to general business, a visit will be made to the mines, one feature of which will be a sail on Lake Temiskaming, and a visit to the old Wright Mine lying near the East shore of the Lake in the Province of Quebec. This is the oldest mine in Canada, having been opened by the Jesuit Fathers and worked intermittently for the lead which it contains. Some of this metal figured as bullets in the early skirmishes and wars with the Indians of this country.

The Cobalt District.

The mines of Cobalt are producing silver at a greater rate than since near the beginning of the current year. Revised estimates for the month of May show a yield of considerably over 700,000 ounces during the period. The largest producer during May was the O'Brien mine, which property produced a total of 312,000 fine ounces, thereby leading all other silver producers in Canada for the month. The O'Brien mill treated 6,066 tons according to official information to the "Journal" correspondent and produced an average of a little over 51 ounces of silver from each ton treated. This was the largest tonnage ever treated in the O'Brien mill in a single month.

Silver production during June from Cobalt promises to undergo a substantial increase owing to the camp's four leading mines all being in full operation. These are the Nipissing, Mining Corporation, O'Brien and Coniagas. It is believed the production for this month will reach an aggregate of between 750,000 and 800,000 ounces. It might exceed 800,000 ounces, except for the reason that the mill at the O'Brien lost the first week of the month owing to breakage in its equipment. From present indications, it would appear reasonable to expect an average production of between 750,000 and 900,000 ounces monthly from the mines of Cobalt during the last half of the current year. In addition to the four leading mines mentioned, there are three other substantial producers, these being the La Rose, Chambers Ferland and Bailey Silver Mines.

Reports this week that the Nipissing had been negotiating for the control of the Hollinger Reserve property at Porcupine, now a part of the McEnaney Estate have been flatly denied by Nipissing officials.

During the month of May, according to official advice to the "Journal," the Bailey custom mill treated 5,015 tons of ore. Of this, 1,055 tons came from the Bailey mine itself and the balance of 3,960 tons was made up of ore from the La Rose, Silver Leaf and Ophir. The Customs plant realized a gross profit of $11,838 during the month. The monthly report of development work on the Bailey mine is favorable. Some high-grade ore was encountered in the West drift. Raise 5B at the west end of the stope was driven to determine the extent of the mineralization in the slate formation overlying the conglomerate. The raise encountered the vein in the slates where quite heavy leaf-silver is present, some of the wall-rock being high-grade.

Ore is being shipped from the Chambers-Ferland mine at the rate of about fifty tons daily to the Bailey Custom Mill. The new discovery reported a week ago in the "Journal" is standing up well as work proceeds.

An encouraging find has been made on the property of the Oxford-Cobalt Company. The find was made in a two-foot fracture in which some stringers occur, one of these being about one inch in width made up of smaltite and carrying 600 ounces of silver to the ton. These values occur within six feet of surface and some little distance from the point where sinking operations were carried on last year. J. W. Russell, president of the Oxford-Cobalt told your correspondent that this would result in a modification of the plans of operation. Heretofore, the plan has been to sink to the lower contact in a main shaft which is already down some 200 feet but which is still considerable distance from the contact. The altered plan is to sink at the point where the new find has just been made and where the Keewatin formation is believed to be not more than 80 to 100 feet thick over the underlying diabase. It is recognized that the zone of mineralization in the Keewatin lies, usually, within about 150 feet of the underlying diabase. Therefore, it is believed the new find is full of promise.

The Mining Corporation will hold its annual meeting in Toronto on June 29th. Business will include consideration of the Engineer's report and the financial statement covering 1920, election of directors and general business. The meeting will also be asked to consider approval and ratification of a by-law proposed by the Board authorising the purchase of shares in other companies out of the surplus funds of the Corporation, at the discretion of the directors.

J. Mackintosh Bell, manager of the Keeley Silver Mines declares the physical condition of the property is steadily improving. The tonnage now in sight is understood to contain well over half a million ounces in silver and assures full capacity operations and silver production at a substantial rate just as soon as the mill is set in operation. Fire destroyed the transformer during the past week, but a new one is being installed and the mill will be running by the end of June.

Elk Lake and Gowganda.

Col. R. P. Rogers, manager of construction work on the proposed light railway from Swastika to Gowganda, declares the work of surveying the route is in full swing, but the date for turning the first sod in connection with actual construction has not yet been set.

With the expectation that rail transportation will cause a big demand for property in the Gowganda district, inquiries for options on properties in that field are quite numerous. Companies holding claims are also making arrangements to finance further exploration and development work just as soon as the line reaches the district. A good many claims are being staked along the route likely to be followed. Prospec-

tive settlers are also searching out the more suitable agricultural areas while some of the more optimistic are endeavoring to locate possible townsites.

Ore and Bullion Shipment.

During the week ended June 10th, two Cobalt companies shipped an aggregate of three cars containing 268,717 pounds of ore, this being made up of 2 cars containing 174,898 pounds from the Coniagas and one car with 93,819 pounds from the Bailey Silver Mines.

During the corresponding period, the Nipissing mine sent out two consignments of silver bullion, totalling 77 bars and containing 100,645 ounces of silver.

THE GOLD MINES.

The Porcupine Field.

The directors of the Dome Mines paid a visit to the property over the past week-end, although president Bache was himself not with the party. It has been noted that the visitors to properties in the Porcupine field exceed in number any previous time in the camp's history.

Directors of the Hollinger also paid one of their periodical visits to their mine, and held a meeting on the property. The mill having attained full capacity operations, there is considerable speculation on the street as to the question of whether or not the management will decide upon further increases. It is pretty well demonstrated that an average of 3200 to 3300 tons daily will be achieved with the present plant, and this would appear to assure an output of at least $10,000,000 a year.

Mining interests in Cobalt are reported to be negotiating for the Hollinger Reserve property which is a part of the McEnaney estate. The Nipissing has been mentioned as among the interests inquiring as to the purchase of the property, but this report was denied by an official of the Nipissing. A week ago it was reported that the property was passing into the hands of a Toronto syndicate.

A party of surveyors, accompanied by about 20 men have pitched camp at Kettle Falls on the Abitibi river where a topographical survey is to be made of the falls with a view to harnessing the power. This work is being done by the Hollinger, which company recently secured the right to develop 25,000 h.p., the Ontario Government reserving 10,000 h.p. for its own possible requirements, this reservation being intended to electrify an extension of the T. & N. O. Rly. at some future date.

At the Dome Mines, the work of over-hauling the stamp equipment which has been idle for some years has been completed, and the capacity of the mill is to be brought up to around 1,400 tons daily. Prior to 1916, the Dome employed a battery of 40 stamps which, during 1916 was partly replaced by the installation of Hardinge conical ball-mills, one of which replaced ten stamps of the old 40 stamp-battery. It was then stated, by utilizing all the available equipment, the mill would be able to treat 45,000 tons of ore monthly or at the rate of 1,500 tons daily. These official figures seem to indicate the present estimate of an average of 1,400 tons daily to be conservative.

During the past year, the Dome produced a little over seven dollars from each ton of ore treated, so that in handling an average of 1,400 tons of ore daily, the indicated output at full capacity with its present mill reaches $9,800 daily, or at the rate of about $3,577,000 a year. This would call for the reduction of approximately 511,000 tons of ore. It has been officially stated that although costs were comparatively high during the past year, this was due to a shortage of labor in the early part of the year and a shortage of hydro-electric power during the closing months of the fiscal year ended March 31st, yet since that time with ample power and men, the cost has been reduced to about $3.75 a ton, with good prospects of a further reduction to perhaps $3.50 a ton. As to this, after allowing for all contingencies, it may be conservatively estimated that on $7 ore a net profit of around $3 a ton may be expected. This would indicate a daily profit of around $4,200 or at the rate of $1,533,000 annually. The Dome has an authorised capitalization of $5,000,000 made up of 500,000 shares of the par value of $10 each. Of these, 476,667 have been issued, at par amounting to $4,766,670 on which dividends are being paid. This means that net profits of $1,533,000 as indicated would be equal to a fraction over 32 per cent on the companies issued capital.

As an indication of the growing interest in gold mining in Northern Ontario are the various parties of visitors to mines in these fields. They are coming to this country from distant points, Europe being particularly well represented and the United States perhaps sending more visitors than any other country. Among the parties visiting Porcupine and Kirkland Lake recently may be mentioned the directors of the Dome, chiefly from the United States; the directors of the Hollinger, these being Canadian; a party of stockholders of the March Gold, a mining prospect in the Porcupine district, these shareholders coming largely from Buffalo, N.Y.; a large party of directors and stockholders of the Kirkland Lake Proprietary to Kirkland Lake from England; a visit from directors and interested parties of the King-Kirkland to Kirkland Lake, entirely Canadian; the directors of the Ontario-Kirkland, from the United States, and various other visitors among which Germany among other countries has been represented.

Kirkland Lake Field.

A syndicate of English interests has been making a quiet bid for control of an enormous acreage of mining land in the township of Lebel lying along the easterly strike of the gold-bearing formations of the proven part of the Kirkland Lake district. Various options have been secured on the properties scattered over that territory lying between the Tough-Oakes Gold Mines and McTavish Lake, a distance of about six miles. From the extent of the activities of this syndicate, it is believed a corporation of mammoth size would be necessary to finance the exploration and development of the properties for which a bid for control is being made.

Underground operations have been resumed on the property of the Bidgood Gold Mines in the central part of Lebel township.

The Northern Development Branch of the Ontario Government is calling for tenders on the work of stumping a road through the township of Lebel, beginning at the Tough-Oakes mine and extending over a distance of about seven miles to the east.

Drifting operations have extended 172 feet along the vein at the 100-ft. level of the King-Kirkland Gold Mines, in the central part of the township of Lebel. The assay sheet over the entire distance has not yet been completed, but from the assay results so far received a substantial quantity of the ore will average upwards of $10 per ton. The mining plant on the property is intended only for exploration purposes, and the

directors and management are now considering the question of whether to continue the shaft to a depth of 200 feet or to direct energy toward opening up some of the other veins which contain encouraging mineralization at outcrop. The plans of the company were announced some months ago in this paper, it being noted that the current Summer's work would consist of sinking the present 100-ft. shaft and, after a limited amount of development work, to turn attention to some of the other veins so as to determine the best possible location of a central shaft. As to this, the results in the present shaft have been so satisfactory as to cause some of the interested parties to believe it might be best to concentrate energy at this point. The writer discussed the question with an official of the company and it would appear probable that the original plans of surface work will be followed so that during the coming Winter the company will be in shape to decide upon the installation of a big mining-plant at a point where work may be carried to great depth without interruption and centrally located to the more highly-mineralized veins. Among other things, the entire surface of the King-Kirkland will be prospected this Summer, that is where the over-burden is not too heavy to trench. The exploration of the surface at a point where the "McGee" vein of the Lebel-Or Company is believed to extend onto the Kirk-Kirkland promises to be full of interest. A party of shareholders concluded a visit to the property early this week, among the visitors being W. Fraser, Brantford; Dr. C. C. Fissette, Brantford; Earnest Moule, Brantford; W. T. Stewart, Toronto; Ferguson Pickett, Toronto; and with C. F. Jordan, president of the company having accompanied the party.

Great benefit is expected to be derived in the Kirkland Lake district from the construction of the proposed Northern Light Railway through this area.

TORONTO COAL PRICES.

Toronto, June 14. Prices obtaining in the various grades of coal during the past week are as follows: Slack ranging from $1.00 to $1.75 U.S. funds at the mines; lump from $2.35 to 3.15; smokeless from $2.35 to $3.15. As regards anthracite, the price of pea coal ranges from $5.85 to $6.20; that of chestnut from $7.60 to $7.80; that of stove from $7.60 to $7.80; and that of egg from $7.30 to $7.80. The independents are charging anywhere from 50 cents to a dollar per ton over the prices just quoted for anthracite. The decrease in the price of slack coal is due to the necessity of moving it away to get other shipments out. There has been some little increase in the demand for lump coal owing to the fact that lake shipments are moving pretty freely. Slack is fairly plentiful. Stove coal, however, is quite scarce. It is hard to tell what the condition of stocks is, as people are still only buying from hand to mouth.

TORONTO METAL QUOTATIONS.

Below are the fair average prices for ingot metals (in less than car loads) at Toronto:

	June 8.	June 15
Copper, Electric	17	17
Copper, Casting	18	16 3/4
Tin	38	34
Lead	6 3/4	7
Zinc	7 1/2	7 1/2
Aluminum	28	30
Antimony	8 1/4	9

TORONTO MINING STOCK QUOTATIONS.

Quotations on Active Stocks on Standard Stock Exchange for Week Ending June 11, 1921.

	High	Low	Last
Silver.			
Aladdin Cobalt	1	3/4	3/4
Beaver Consolidated	32 1/2	31	31
Chambers-Ferland	7	6	7
Coniagas	1.70	1.70	1.70
Crown Reserve	11	10 1/2	10 1/2
Gifford	7/8	3/4	3/4
La Rose	20	18 1/2	20
McKin.-Dar.-Savage	19	19	19
Mining Corp. of Can.	1.26	1.11	1.11
Nipissing	5.00	4.75	4.75
Ophir	1 1/2	1 1/2	1 1/2
Peterson Lake	5 3/8	5	5
Temiskaming	20 1/4	20	20 1/4
Trethewey	16 1/2	16	16
Gold.			
Apex	2 5/8	2 1/2	2 1/2
Atlas	22 1/2	20	22 1/2
Dome Extension	75	75	75
Dome Lake	6 1/8	5 1/4	5 1/4
Dome Mines	21.00	18.80	18.80
Gold Reef	3	2 7/8	2 7/8
Hollinger Cons.	7.25	6.96	7.00
Keora	11 3/4	8	11 1/2
Kirkland Lake	48	45	45 1/2
Lake Shore M. Ltd.	1.22	1.15	1.16
McIntyre	1.95	1.89	1.90
Moneta	11	11	11
Newray Mines, Ltd.	6 1/4	5 3/4	5 7/8
Porcupine Crown	21	14	14 1/2
Porcupine V. N. T.	21 3/4	15	17
Preston East Dome	3	2	2
Schumacher	20 1/2	19 1/2	20
Teck-Hughes	14 1/2	12 1/4	13
Thompson Krist	6 1/2	4 1/4	4 1/2
West Dome	6 1/4	5 3/4	6
Oils.			
Vacuum G.	9 1/4	6 1/2	8 1/2

MONTREAL METAL QUOTATIONS.

Following the fair average prices for ingot metals (in less than car loads) at Montreal:

	June 16	June 8
Copper, Electric	18	18 1/4
Copper, Casting	17 3/4	18
Tin	37	38
Lead	6 3/4	6 3/4
Zinc	7 1/4	7 1/2
Aluminum	31	32
Antimony	7 1/2	7 1/2

British Columbia Letter

Stewart, B.C.—It would appear that the strike at the Premier Mine, Portland Canal District, is not going to interfere with the working of that property, nor with the progress on the aerial tramway under construction, to a material extent. Dale L. Pitt, the manager, during the closing days of last month announced that the trouble was at an end, and that all tramway workers, teamsters, tractor-men, and part of the mine crew had returned to their jobs. The tramway, it was stated, would be pushed forward. Two new camps had been opened and the Company was sending out fifty men who were to receive $5 a day. The mill is nearly completed, all the tramway right-of-way has been cleared, and the construction towers have been planted.

There are several reports current with respect to the future of the Big Missouri Group of Mineral Claims, Salmon River, Portland Canal District. Pat Daly, who has been in New York for some weeks, is said to have bonded the property and to have received a substantial cash payment in this connection. If this is authoritative work will be started this summer. The Lindenbourg Brothers, Andy and Dan, owners, also are said to have made good progress in the same direction, and it is stated that Dan will have some satisfactory announcement to make shortly regarding financial arrangements necessary for the continuance of development. The Big Missouri was bonded to Sir Donald Mann who, after some work and the securing of a report from Prof. Bancroft, of McGill University, ceased operations. While the effect of this event undoubtedly was felt in the camp it did not discourage the large body of miners and prospectors interested in the district. Their faith remained, not alone in the section, but as well in the particular property in question, and there are many practical and otherwise qualified men who declare that the Big Missouri has a future as a producer. Pat Daly is said to have also succeeded while in New York in bonding the Fraser Group of Mineral Claims, Marmot River, Portland Canal District.

The showings on this property are large and have been proved to some depth. The possibility of establising a hydro-electric plant to provide the residents of the towns of Stewart and Hyder with electric light and with a telephone service is being investigated.

The claims against the Spider Group of Mineral Claims are being settled. This is a property of the Algunican Mining Company, which has done considerable development in the district. It is now reported to be in straightened financial circumstances.

News has been received that the Alaska Gastineau Mine and Mill have been closed down permanently, thus throwing out of employment some 400 men. Possibly a wood-pulp and paper-manufacturing plant will be established in the locality, inasmuch as the necessary power is developed and ready to hand, and considerable of the needed machinery would be immediately available.

Hedley, B.C.—The Hedley Gold Mining Company will reopen the Nickel Plant Mine on the 1st of July. This announcement was made shortly after the return recently of Mr. G. P. Jones, general manager. The mine has not been working for some months, having been closed down because of unsatisfactory conditions relative to gold mining costs as against the fixed value of the precious meal. There having been a material change, the mine is to be put on a producing basis without loss of time. The Nickel Plate is the great gold mine of British Columbia, having paid during the past ten years more than $2,500,000 in dividens.

Trail, B.C.—Ore receipts at the Trail Smelter, of the Canadian Consolidated Mining & Smelting Co., for the week ending May 22 aggregated 9,587 tons, all of which, with the exception of one very small shipment, came from the company's mines. This brings the total for the year up to 167,662 tons.

Vancouver, B.C.—The Bullion Mining Company once again has been the subject of litigation. R. T. Ward, as manager of the Syndicate and trustee of the claims, recently asked for an injunction restraining his partners from operating and developing the property along lines that do not meet with his approval. He asked that the thirty men employed be asked to cease their work. It was argued by the other side that Mr. Ward was nominal trustee of the mine, only for the purpose of registration of title, and that a majority interest was held by those favoring the present development policy, Mr. Ward's interest having been placed, in a previous action, at 3 4-10 per cent. This view was accepted by the Court, and Mr. Ward's application dismissed. At present a 500 foot tunnel is being driven through rock, disused flumes and ditches are being repaired, and the management expects to make a clean-up this fall.

Considerable geological survey work is to be carried out in British Columbia this summer by the Geological Survey Branch, Ottawa. The districts to receive attention are Graham Island, the mainland coast from Burke channel to the head of Royal Island, the Coquahalla Pass, Comox and the Gulf Islands, Alice Arm, Lardeau in the Kootenays, Windermere in the Kootenays, the North Thompson, and in the Yukon Territory, the Mayo District. Dr. W. E. Cockfield already has started for the Yukon to continue his work there. He will cover the Mayo zone of which much has been heard of late, and is accompanied by N. T. Ellis, C. A. Merritt, and T. D. Guernsey, student assistants. Dr. Victor Dolmage, who has just concluded a three year survey of the west coast of Vancouver Island, will work over the field extending from Burke Channel north. He already is on his way in his own boat and with two assistants. Mr. C. E. Cairns is taking a party into the Coquahalla Valley to continue work begun last year. Mr. F. H. McLaren will go to Graham Island, of the Queen Charlotte Islands, to study the geology of that section with particular reference to oil shale and other oil indications which have been attracting attention. J. D. MacKenzie, who is in charge of the Vancouver Station of the Geological Survey, will visit the Comox to report on the coal deposits of that part of Vancouver Island, and also will make the first geological survey of the Gulf Islands. G. Hanson, also of the Vancouver Station, will report on the mineralized zone traversed by the Kitsault River in the Alice Arm District. Dr. S. J. Schofield will gather material for the making of a geological map of the Windermere District to supplement the topographical map now available. Prof. Uglow will go to the North Thompson River; M. F. Bancroft will continue his several years work in the Lardeau, and Mr. William Johnson will carry out researches in the Cariboo. From this outline it is quite evident that the Dominion Geological Branch is perhaps more than usually active in this Province. Such a policy will be appreciated by the mining men, because there is no doubt that there is much geological work to be done in the Canadian West, and it is equally beyond question that the information thus obtained is

of great value to those interested in a practical way in the location and the development of the mineral resources of the country.

Victoria, B.C.—A branch of the Canadian Institute of Mining and Metallurgy has been formed in Nanaimo, B.C., as a result of a recent visit paid to Vancouver Island by Mr. George C. MacKenzie, Secretary of the Institute. Representatives were present from Cumberland, Extension, Ladysmith, Cassidy, East Wellington, as well as from Nanaimo. Officers were elected as follows: Chairman, George O'Brien, Cumberland; Vice-Chairman, F. A. Spruston, Ladysmith; Secretary-Treasurer, W. H. Moore, Nanaimo; Local Council, John John, Nanaimo; C. M. Campbell, Cassidy; C. Graham, Cumberland; and James Strang, Extension. It will be noted that all the centres mentioned are situated in the Island coal fields, so that there is no doubt that the work of the new branch will have to do with coal mining and the advancement of the industry, and the welfare of those identified with it, in co-operation with other branches of the Institute throughout the Dominion.

An expedition of considerable proportions is being organized by Mr. Stuart Henderson and associated mining men to leave for the far northern parts of British Columbia in the course of a few weeks, the object being the location of certain gold and other deposits which have been reported to them. These reports, it is understood, have come from "sourdough" prospectors, and also from the Indians. They are so circumstantial in character, and have been so well supported by samples, etc., that it has been decided to make a systematic investigation. If the expedition is as successful as its sanguine promoters predict there is no doubt that there will be another gold rush into some section of the Cassiar before many months have elapsed.

News of the successful completion of a trip by a party of nine men from Carmacks, a small centre on the Yukon River, to Fort Norman, the hub of the newly discovered northern Canadian oil field, has been received from Atlin, B.C. The distance covered is estimated as being 675 miles. Carmack was left on the 20th March last, Norman was reached on the 18th April. Six days were spent there in staking land. Thirty-five dogs did the hauling of sleighs carrying supplies over the snow. The winter trail is described as having been quite good. Only one divide had to be crossed, there being a gradual ascent to an altitude of 1,500 feet. Game was very plentiful and included moosee, caribou, sheep and ptarmigan. Actual travelling time was: going, 26½ days; returning, 27 days. The party was headed by J. McDonnell, of Vancouver, B.C., and is the only one to make the trip last winter with the exception of the Japanese, Wanda, who went in from Edmonton, Alberta.

The reorganization of the Western Fuel Corporation of Canada, Ltd., until lately known as the Canadian Western Fuel Co., is complete. The change in name will not bring about that reconstruction as to management or as to policy. The directing heads are the same, Mr. C. W. Bowen being the Vice-President and Managing Director, and Mr. John Hunt General Manager. It is hoped, however, that the launching of the new corporation presages the disposition to be ready for an extension of the development of the company's mines and coal lands when the market conditions warrant. At present work of this kind scarcely would be opened up because the domestic trade is at low ebb and lumber business is by no means good. However, an improvement, with the return to stable conditions industrially throughout the world, will come, and the company proposes to be in shape to meet an increase in demand as soon as it becomes apparent.

There is to be a conference of the coal operators, dealers and the consumers of British Columbia to consider the whole question of coal production, transportation, and distribution with a view to deciding whether it is not possible to "cut" expenses and reduce the cost to the user. This is in line with a recommendation made by Mr. A. Henderson, who recently conducted an Inquiry into the matter of coal costs in this Province. Mr. Henderson observed that it was "not too much to hope that there could be devised a delivery of coal by operators to dealers and by dealers to consumers and much cheaper without imposing on operators or dealers undue losses." It also was stated that the operators and dealers were willing to enter into such consultation and that the result might be a reformation of some of the ways, not only of operators and dealers, "but also those of us who are consumers." The consumers would get new ideas on the subject of the best coal to use, the best mode of securing delivery, and also the best methods of using it, particularly in furnaces. Recognizing the force of these arguments, Hon. Wm. Sloan, Minister of Mines, states that the Conference will take place at an early date to be fixed and that all the recommendations made by Commissioner Henderson, and General R. G. E. Leckie, the mining engineer who acted as the former's technical counsel, will be given careful consideration.

Judgment has been given against the Pacific Coast Coal Mines Ltd., Vancouver Island, for $69,500 which amount is made up of wages due and unpaid to miners who had been in their employ. This Company's Mine known as the Morden Mine, has been closed since December 11th. It is considered likely that, as soon as the financial affairs of the concern have been straightened out, such obligations as those indicated will be met and operations will be resumed.

At the present time there is a reserve on the coal lands of British Columbia. This refers, of course, to unalienated crown lands. The government's policy in this respect does not appear to be popular among the prospectors. The Omineca Prospectors Association protests against it, asserting that the reserve is "retarding the development of the natural resources and industries of the Province and is therefore detrimental to progress and prosperity."

Residents of Prince Rupert and other northern provincial coast communities are having some difficulty in getting a supply of cheap domestic and industrial coal. Most of their requirements now are met by supplies taken from Vancouver Island. There are deposits, however on the line of the Grand Trunk Pacific Ry. which if developed, would more than meet the needs. One of these now is receiving attention. It is known as the Aveling coal fields and is situated a few miles up the Telkwa River. It is of high grade quality and there is a fourteen foot seam described as being second to none in the Province. A tunnel has been driven 80 feet and is to be continued. Bunkers are to be constructed at the railroad and it is expected that the output will be augmented this fall that a good part of the coast trade

will be taken care of. The operators, however, have one difficulty and that is in regard to freight rates. These are just 40 cents a ton less in carriage to Prince Rupert than it is from Alberta to the Coast. They argue that, in view of the much greater mileage, the difference in their favor is insufficient and are going after a material reduction.

Robt. Dunn, Victoria, BC.: The coal market in British Columbia during the month of May was decidedly slack in respect of the domestic grades. This is forcibly shown by the fact that the Canadian Western Fuel Co., Nanaimo, B.C., which supplies a large part of the domestic trade, was working short time to a considerable extent. The point is further emphasized by the maintenance of sales by the Canadian Collieries (D) Ltd., speaking comparatively, which concern depends more upon its bunker business than on the domestic consumption of its product. It would appear that the householder is holding back in the belief that the prices are about to decline materially. Those in the habit of filling their bins for the winter at this time of the year do not care to be caught buying on a falling market, hence their hesitation.

An interesting statement appeared recently in one of the Washington State newspapers to the effect that the price of Ladysmith coal would be cut 50 cents a ton on the 1st of July. Although there does not seem to be any aeknowledged authority for the announcement the information may be true. At any rate it is reasonable to suppose that, if at all possible, the British Columbia operators will bring down the retail prices of domestic coal. As conditions now are there is little of their fuel selling in the American market and the sales are likely to remain small until Canadian coal is quoted somewhat under that coming from Utah and other competing American districts.

What will be the developments of the next few months is difficult to predict. Notwithstanding the Washington State strike it is stated that there will be no shortage of domestic fuel this winter. There may be lack of steam coal but that will be met by an abundance of cheaper fuel-oil.

NOVA SCOTIA COLLIERY NOTES.

Coal outputs for May from the Cape Breton collieries of the Dominion Coal Company were 273,445 tons, comparing with 175,324 tons in April. May production exceeded that of May in 1919 and 1920. Fairly steady work at the collieries has been made possible by large movements of coal to St. Lawrence ports, and by some shipments overseas which are a result of the British coal strike. Partial operation of the Steel Plant in Sydney in producing steel rails for the Canadian National Railways is expected, which will provide an outlet for coal that has been greatly missed during the past six months. No definite business for the steel plant is in sight after the conclusion of the rail orders, which is expected about the end of September, and it may be expected that the operation of the collieries during the Summer months will be guided largely by the prospective outlet for coal during the Winter of 1921-1922. Closing down of some of the more expensive mines, and concentration of the faceworkers in other more favorably circumstanced mines, may take place, as unless the balance of productive workers to non-productive employees is redressed, the cost of coal production will become competitively impossible. A production of exceeding 300,000 tons is hoped for from the Dominion Company's Cape Breton mines during June month.

The output of the Nova Scotia Steel Company during May was 43,182 tons, comparing with 34,718 tons in April. The Scotia Colliery (No. 4 Mine) has been permanently abandoned, and partially dismantled. The new mine, No. 7 Colliery, opened on the Lloyd's Cove seam near the seashore betwen Florence Mine and the abandoned Scotia pit, produced 5,747 tons in May, and will increase its production in June. The Florence Colliery and the Princess Colliery, because of the unification of the coal leases under British Empire Steel management, are now permitted to extend their working faces in a manner that will greatly facilitate coal-getting, and immediate advantage is being taken of the removal of prohibitions that had for some years worked real injury to coal production.

An example of the adaptation to circumstances made possible by the consolidation of the coal companies in Nova Scotia is the recent shipping of two cargoes of coal from Pictou Harbour, N.S. to St. Lawrence points. The coal was from the Acadia Coal Company's mines at Stellarton, and was shipped in the "Watuka" and "Volunda" two steel-freighters of about 2,700 tons dw. both built by the Nova Scotia Steel Company at New Glasgow. It is many years since the Pictou loading pier was used for shipment of coal. The British Empire Steel Corporation possesses coal-loading plants at Sydney, North Sydney and Louisburg in Cape Breton Island, and at Pictou, Parrsboro' and Halifax on the Mainland, and it can send coal from mines in Cape Breton, the Pictou County field, or Springhill Mines, as occasion may require, for loading at the several ports to minimise the length of the rail-hauls and to suit the convenience of the available steamers in regard to times of arrival and point of destination. A central despatching office for the freighting fleet will control all ship movements. Wireless telegraphy is proving to be an indispensable aid to work of this kind.

ASK ABOLITION OF ASBESTOS ROYALTY.

By Canadian Press.

Quebec, June 14.—Representatives from leading asbestos companies waited on Hon. L. A. Taschereau, Prime Minister of Quebec, at 11.30 a.m. to-day, the delegation being composed of W. G. Ross, of Montreal, Vice-President of Asbestos Mining Operators, of Quebec; J. B. Waddell, of Montreal, Vice-President, Consolidated Asbestos Company, Limited; D. H. Pennington, of Quebec, Proprietor, Pennington Asbestos Company; Hon. George R. Smith, M.L.C., of Thetford Mines, Vice-President, Bell Asbestos Mines, Inc.; Major Oulster, of the Federated Asbestos Company; J. A. Jacob, of the Black Lake Asbestos and Chrome Company, and E. Stafford, of the Quebec Asbestos Corporation.

A strong plea was presented in favor of provoking the five per cent. royalty on the asbestos output of the Province of Quebec. The delegation stated that South African asbestos concerns are strongly competing with Quebec, and until this tax is removed the asbestos mining industry here will be severely handicapped.

A memorial was presented showing the progress of the South African asbestos industry, and emphasizing that this product is now being sold in great quantities in the United States and Great Britain.

INTERNATIONAL NICKEL CO.

Earned 89 Cents A Share On Common, Against $1.32 In 1919-20.

N. Y.—International Nickel Co. has issued its annual report for year ended March 31, 1921. Surplus after charges and taxes amounted to $2,029,700, equivalent, after deduction of preferred dividends, to 89 cents a share, par $25, earned on the $41,834,600 outstanding common stock. This compares with surplus of $2,745,734 or $1.32 a share in the previous year.

Consolidated general profit and loss statement compares for the year ended March 31, 1921 as follows:

	1921	1920	1919
Earnings	$4,059,647	$6,064,762	$11,186,301
Other inco.	1,106,934	300,710	25,217
Gross inco.	5,166,581	6,365,172	11,211,521
Exp. tx., etc	978,731	1,478,112	2,961,363
Dep. min. exch., etc.	2,158,150	2,111,326	2,324,529
Balance	2,029,700	2,745,731	5,922,629
Pfd. div.	534,756	534,756	534,756
Com. divs.			4,183,460
Surplus	1,491,944	2,210,978	1,204,413

N. Y.—In the International Nickel annual report, President Bostwick states that, while operations in first six months were approximately 60% of capacity, beginning with third quarter were reduced until close of the fiscal year found plants running only 20%.

Foreign business, as well as domestic, was small, due to industrial depression as well as stocks of nickel carried European stocks were only partly liquidated during the year, but "indications of the last two months in the United States are that stocks in many consumers' hands are gradually becoming exhausted, and the result has been increased demand, not as yet large but from an increasingly large number of consumers."

Considerable progress was made in developing markets for Monel Metal and nickel in various rolled forms, with outlook for continued expansion excellent. The company is building a rolling mill near Huntington, W. Va.

Pres. Bostwick says: "No dividends have been declared on the common it having been deemed advisable to maintain financial position of the company and conserve cash resources for such capital expenditures as necessary to complete new rolling mills under construction."

BRITISH EMPIRE STEEL CORPORATION STAFF APPOINTMENTS.

Pursuant to the policy of concentration and unification of management which is to be followed in the staff appointments of the British Empire Steel Corporation, Alexander S. McNeill, since 1919 Superintendent of Mines for the Nova Scotia Steel & Coal Company, and previously for twenty years in official positions with the Dominion Coal Company in Cape Breton, has been appointed General Superintendent of Mines for the Dominion Coal Company's collieries, which gives him, in addition to continued supervision of the Nova Scotia collieries, also charge of all the Dominion collieries in Cape Breton Island and at Springhill Mines on the mainland of Nova Scotia, approximately 25 collieries in complete or partial operation. Further

lars of Mr. McNeill's career were given in our issue of 14th May, 1920, see page 392).

Consolidation of engineering supervision, purchasing and warehousing departments, and upkeep and repair work, will be achieved by further appointments from among the resident staffs of the constituent companies of the Corporation, announcement of which is shortly anticipated. While the staffs are somewhat diminished in number as compared with some years

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ago, official changes have taken place largely within the personnel of the constituent companies of the Corporation, which is fortunate in possessing a number of capable officials thoroughly acquainted with the technical history and physical characteristics of the various coal, ore and limestone properties, and the operating of the mines and steel plants. An unusual opportunity therefore exists, and it is understood will be taken advantage of, to reorganize the staff so as to restore former efficiency, and give the Corporation the benefit of technical direction by specialists already trained in and acquainted with the local conditions. While some expert advice on technical matters peculiar to the Corporation's mining properties, such as undersea workings in coal and iron-ore, will doubtless be obtained for strengthening and confirmation of local experience, it is not believed the management of the Corporation contemplates the securing of officials from outside. It is unlikely also, in view of trade conditions, that any large programme of extensions will be entered upon, and a policy of enlargement of output from present openings and plant equipment, combined with strict economy and concentration of working forces, should enable a decrease in unit cost of production.

With Mr. D. H. McDougall as Vice-President in charge of all technical operations, the British Empire Steel Corporation will have at its head an official who was born in Glace Bay, and whose official experience in the service of the constituent companies includes intimate knowledge of coal, iron-ore and limestone mining, railway and plant construction, steel-plant operation and both rail and water transportation: in addition to personal acquaintance with the officials and workmen of the Corporation and thatlocal knowledge of men and things which is as essential in successful management as it is difficult to acquire. Mr. McDougall's unique knowledge of the coal and iron trades in Nova Scotia will enable him to give due importance to the several departments of the Corporation's business, and to preserve a balance in expenditure and development of the varied products it can put out that is most essential to the financial success of a Corporation which, being blessed with two strings to its bow, must know which of them to pull.

NEW OREBODY AT O'BRIEN MINE?

During the past few weeks there have been numerous rumors to the effect that an important discovery had recently been made at depth at the O'Brien silver mine at Cobalt. The owners have not given out any information concerning the discovery, but recent heavy shipments from the mine lend strength to the reports.

EDITORIAL

USE OF OIL DURING BRITISH COAL-STRIKE.

There is a tendency in British newspaper comment to emphasise the coming importance of oil and to dethrone King Coal. One well-informed financial paper sums up general opinion in Britain by stating: "While coal is anything but doomed, the lesson of the coal strike is that it is far less indispensable than was commonly supposed". It is quite true that the country has fared less badly as the result of a three months strike of coal miners than was generally expected, but there are some reasons for this that are not connected with the indispensability of coal, but result from political and trade conditions. It is quite evident that the country was well prepared for the coal-strike. Its occurrence was forecasted by this journal last November upon statements made in the British trade journals, so that there was no element of surprise in the calling of the strike. Since last November the output of British coal-mines was not being fully used by industry, because the state of trade did not permit it, and the country was well provided with stocks of coal when the strike broke out. Also, the metallurgical industries were and are at an almost unparalleled stage of non-productivity, and, in any case, whether there had been a strike or not, the demand for coal for home consumption in Britain would not during the past three months have equalled the supply.

The substitution of oil for coal has been aided by the fall in the price of petroleum and the unloading of stocks in Britain by the United States government, the slump in shipping being both the cause of the overplus of oil and the availability of ships to take it to Britain.

A distinction must be made between the proved excellences of oil as a source of motive power, and the comparative merits of petroleum and coal as a source of motor oils. Unless there is a real fear in the minds of well-posted oil technologists that the supply of petroleum from flowing wells is about to prove insufficient for the world's needs, the political pother about national control of oilfields would appear to amount to much ado about nothing. Yet, it is tolerably certain that there is excellent reason for national solicitude on this score. It cannot be said that the petroleum supplies of the world are assured either as to quantity of annual yield or as to continuance of such yield, because petroleum is essentially elusive, and its reserves cannot be calculated with the definite accuracy that coal tonnages can be. Consideration of the known extent and accessibility of the world's coal reserves will show that, if the technology of the future should acclaim oil as the ideal source of energy, the coal-seams of the world will provide the most dependable source of supply.

So far as Britain is concerned, with the exception of some deposits of oil-shales, there is no domestic source of petroleum, and it is obvious that if Britain were to change from the status of a manufacturing country producing its own source of energy in the form of coal from within its island borders, to a country dependent upon outside countries as a source of energy, the traditional Britain and its strength would become a thing of the past. This is unlikely to happen. What the British people will do is to develop means of extracting all the energy contained in coal that science may make possible, and to use that energy completely and efficiently. It is probably a very good thing for countries whose industrialism is based on coal supply to get an occasional jolt from interruptions of supply and the competitive use of oil. In Britain and in the United States coal has always been too plentiful and too cheap to be properly valued. Had it been less abundant and more costly, men would earlier have devised means to make it go further by getting greater value out of the quantity used.

English papers, however, that indulge in loose talk about the lessened indispensability of coal, and mistake the temporary effects of a miners' strike for a permanent tendency, should first ask themselves whether Britain is prepared to relinquish such portion of national importance as proceeds from her coal seams. We cannot think of anything that would be left worth having if she did, except her population, and she would not long retain that. Fortunately for Britain, while her island coal seams have suffered heavy depletion, and while coal mining must always be carried on at a relatively higher cost per ton than will be the case in North America during contemporary periods of the future, she is still generously supplied with coal, reckoned on European standards. Moreover, it is not with-

out significance that in two districts of England, namely southeastern Yorkshire and north Lincolnshire, and in Kent, there has in recent years taken place two of the most important developments of coal-mining in the whole Empire. No part of the Empire has seen such a definite "boom" in colliery extensions, in new towns and in building and in railway extensions as has taken place in these two districts within the past ten years. These developments were not the result of the war, but of the finding of new coalfields and the normal demand for coal in Britain.

FIREDAMP EXPLOSIONS.

Mr. James Ashworth's communication in this issue is really a continuation of the discussion on the paper read by Dr. Wheeler before the Midland Institute, and it seems necessary to point out that Dr. Wheeler was careful to note that the title of his paper might be misleading, being not written with reference to the conditions attending colliery explosions, but being a record of scientific measurements and observations upon the behavior of explosive mixtures of firedamp and air when ignited under differing conditions. In the discussion upon his paper, Dr. Wheeler remarked: "A very wide subject is opened up by a consideration of what occurs in colliery explosions underground, because in nine cases out of ten, or in ninety-nine out of a hundred, we are not then dealing with firedamp explosions alone, but with the added effects of coal-dust." "I know of only two instances" stated Dr. Wheeler, "where it was possible to regard a colliery explosion as being due to firedamp alone".

It is a sign of the times that so many papers should now be presented to technical gatherings that are records of work in pure science. One of these present when Dr. Wheeler's paper was read remarked that it was an excellent instance of how much science is "measuring", the paper being really "a record of measurements of phenomena that we have hitherto known about only in a general way". It is often difficult for practical men faced with the combatting of physical forces, or the handling of raw materials, to see the application of the detached laboratory investigations of pure scientists, but in recent years we have had most abundant examples of how apparently unrelated scraps of information upon physical phenomena have been pieced together, and eventually proved to have definite and valuable economic applications. It has been appositely remarked that "what the worker in pure science discovers his fellow in applied science utilizes".

There is one feature that remains very clear after perusal of literature relating to coal-mine explosions, especially in the light of Dr. Wheeler's admission that few coal-mine explosions are attributable to the presence of firedamp alone. This is, that the originating cause is always the introduction of naked flame into the myriad physical states of a coal mine that permit of the development of the phenomena of "detonation". The most obvious preventive precaution is suppression of every source of the presence of naked flame in a coal-mine. This precaution is, of course, the most difficult thing of all, but the substitution of the electric-light for all varieties of flame-lights, and the prohibition of the use of explosives of the flaming variety are two precautions that in the light of the present-day knowledge seem almost elementary. Probably we indulge in no over-statement however, in observing that there is more coal being mined today without the taking of these elementary safeguards than is being mined under their enforcement.

PUBLICITY FOR CANADIAN MINING IN LONDON

We reprint in this issue an editorial on "Canada's Minerals" from the "Financier" which refers to the small measure of attention that Canadian mineral enterprises have awakened in Britain, and mentions that the reason for this lack of interest is being remedied by an intelligence service instituted in the City by the Canadian Government, the efficiency of which is praised. This editorial gives point to the suggestion which was pressed upon the Ontario Minister of Mines by the Temiskaming Prospectors' Association recently. Mr. Mills said the Ontario Government had spent a thousand dollars on advertising in Britain, and had sent over rich mineral specimens for exhibit there. The impression we get from reading English exchanges, and particularly those papers that specialise in reporting the financial affairs of mining enterprises, is that the attention which Canada has so far attracted as a place for mining investment is of the most meagre character. The "Financier" rightly says "the mineral potentialities of Canada have not received that measure of attention which is justified by the facts". To read the advertising literature that is so plentifully distributed in Britain by federal and provincial departments and by the transportation companies is to be struck by the superabundant references to agriculture. It would be interesting to compare the amount spent by the Ontario Government on advertising farming possibilities with the thousand dollars spent on advertising mining possibilities. And yet there is a very large portion of Ontario which will always be more important as a source of useful minerals than from an agricultural point of view.

SPECIAL NORTHERN ONTARIO GOLD-MINING ISSUE.

A special issue of the "Journal" dealing with recent developments in the gold-mining industry of Northern Ontario will be published early in July. Mr. R. E. Hore, the Consulting Editor of the "Journal" has recently visited the gold-mining centres of the North, and the information that he has secured will be of a nature to explain the very definite optimism that now exists in the North, and is voiced, according to our Northern Ontario correspondent, by executives not given to over-statement.

SOMEBODY has been good enough to put the Editor on the "sueker list", and he is receiving, with a frequency that portends good times for the printer, literature emanating from Fort Worth, Texas, advertising the Marine Oil Syndicate and the Advance Oil Company of that place. The President of the Advance Oil Company addresses us as "Dear Mr. Gray" and signs himself "Sincerely", and presents what he calls "a real two-sided proposition". We have not been used to such treatment from presidents, and had hitherto regarded the species as being of a distinctly one-sided variety. Mr. Bierkamp (a name wasted in Texas) suggests we take a chance, and mentions that "everything we have on this earth we get by taking a chance". That's right. We got a number of things that way. Mr. Bierkamp suggests the purchase of ten shares of Advance Oil stock at one dollar per, which he says "won't break you, and may go a long way towards making you". "There is nothing that makes big money faster and surer than oil gushers". Except oil-stock "suckers" maybe. One does not need to go to Fort Worth to take a chance. Perfectly reputable Montreal stockbrokers will sell one perfectly good stocks that are chancy enough to suit the most exacting tastes.

Another unknown friend offers "the greatest money-making offer it has ever been my privilege to offer to my friends and clients", led thereto by "chance, good luck, good judgment, unusual foresight, intuitive knowledge, or a guidance that cannot readily be explained". We suggest the Ouija board as a possible explanation. So far as we can gather, Messrs Gilbert Johnson and Company offer us participation in the profits of the "greatest oil-pool in Northern Texas" and in what is probably "the richest oil zone on the American continent" for fifty dollars a share, with a discount for cash down. Mr. Johnson states his belief that he will be quickly able to make these fifty dollar units worth from five hundred to a thousand dollars each, whereupon we see clearly the irksome nature of daily toil and feel like following the advice of Mr. Bierkamp to take a chance.

Both the philanthropists who have discovered the Editor's sylvan retreat quote testimonials as to their wealth and probity from lawyers, printers, hotel proprietors, jewellers, oil-map manufacturers and opticians. The connection is somewhat obvious, all except the optician.

Mr. Bierkamp writes: "May-be you thought my letters to you were just oil circulars, and didn't need a reply—that I just took your name out of a telephone book, or a directory, or sent letters like yours to everybody in town". Funny how these gentlemen read one's thoughts. "Well", says Mr. Bierkamp, "I didn't. I HAD A SPECIAL REQUEST TO WRITE YOU". Mr. Johnson is still more cruel. He writes: "Your name has been suggested to us as one interested in Texas Oil developments". The Editor is wondering who is the suggester.

The oil industry, according to Mr. Bierkamp, is the "safest, surest and most profitable business in the world today". It sure is—for people in Fort Worth, Texas, and for the satellitic jewellers, bankers, hotel proprietors, etc., that attend upon the oil-stock promoter.

The conference of operators, dealers and consumers held at Victoria, B.C., to talk over the retailing of coal seems to have been a very practical and sensible affair. Particularly sensible was the decision of the coal-dealers to push the sale of run-of mine coal and to discourage fancy sizes of coal, re-sereening, forking and other methods of decreasing the general quality and increasing the general price of coal to the consumer. People pay high prices for lump coal, but if they investigated would probably find that the furnace-man smashed it up with a hammer before feeding it to the fire.

British Columbia is not the only place where these traditional and archaic practices survive, and a little conference between operators, coal-dealers and consumers, would be mutually helpful in many urban centres.

Our contemporary in British Columbia, "Mining and Engineering Record" criticises the action of the B. C. Department of Mines in prohibiting the use of naked lights in coal mines throughout the province as unnecessarily restrictive, stating that there are some coal-mines in British Columbia "that are as safe as metal mines so far as open lights are concerned, and which can be more conveniently worked by such lights". We utterly deny the advisability of using open lights in any coal-mine, no matter how reputedly safe it may be. Safety, in a coal-mine, is a matter of degree. Coal-dust alone is a high explosive, brattice cloth and pit timber are inflammable substances, blasting powder is generally used in coal mining, and is not a safe substance to handle in the darkness by the aid of an open light. The absence of "firedamp", over a term of many years in the working of a coal-mine, is—as has been all too-often proved—no guarantee that it will not suddenly make its appearance. Our contemporary criticises the prohibition of naked lights in British Columbia as savouring of "continued tinkering" and as adding to the complexity and cost of coal production. We would emphasise a former opinion, namely that it is a thoroughly well-justified policy, and would add that it has received uniform approval from many distant quarters, both in Canada and abroad.

Firedamp Explosions

By JAMES ASHWORTH, Livingstone, Alberta.

Prof. R. V. Wheeler, D.Sc., having recently contributed a paper on this subject to the Midland Inst. of Mining, Civil and Mechanical Engineers, it will, through its publication in the transactions of the British Inst. of Mining Engineers (Vol. LX, part 2), circulate throughout the whole world and arouse general interest. Its author is well known, and as he has been for many consecutive years engaged in experimental work for the British Government he will therefore be taken with more seriousness than the work of a layman would be. The paper is divided into five sections: No. I, Introduction; II, Firedamp; III, Limits of Inflammability; IV, The Propagation of Flame; V, The Vibratory Movement of Flame. The object of the paper is stated by the author as "not being a disquisition on mining disasters due to firedamp but as describing the conditions necessary for the continued propagation of flame in mixtures of firedamp and air, and details the different characteristics of the flames produced dependent upon the different conditions under which ignition of the mixtures is effected."

One of the first things which draw the attention of the reader who is looking for information on this ever present danger, is that the most important factor in a modern colliery explosion, viz, coal-dust, is not included, nor is another factor named in any form, viz, water vapour; neither is there any information as to why these are omitted. The next notable feature is that the Professor suggests the use of the un-scientific term "firedamp" as meaning methane. This is explained on the second page as being due to the fact that the firedamp of British mines contain as its inflammable constituent methane (CH_4), in predominating quantity.... For all practical purposes, therefore, the firedamp of British coal-mines can be regarded as "methane." In this paper then, the words methane and firedamp will be used as meaning the same thing."

After reading this reasoning, which by the way carries no convincment as to its suitability or usefulness, it is notable that the author only uses the term once or twice in the major balance of his paper and it is not surprising that one of the members present when the paper was read asked the Professor if he would not regard "firedamp" as an unscientific term, to which he replied, "It is a very useful term."

In regard to this the writer has always understood the term firedamp to mean a mixture of any explosive gas found in a coal mine when mixed with air, and that methane was methane, and ethane was ethane. As a practical example it would appear that Prof. Wheeler considers 95% of methane as firedamp (without air admixture), and therefore the natural gas used by the U. S. A. Bureau of Mines to ascertain "The Relative Safety of Brass, Copper and Steel Ganzes in Miners Flame-Safety-Lamps", consisting of 82% methane, 16.4% of ethane and 1.5% of nitrogen would be firedamp also.

Such reasoning seems utterly absurd, and more so when we note that the presence of the higher hydrocarbon gases is now assumed to be acertain indication of an active gob fire; thus if after an examination a colliery official reported only "firedamp", the management wohld be justified in assuming that there might be heating, but no fire.

Now let us see what other advancement Prof. Wheeler has made, take first, the rate of explosion in gases, and compare them with Prof. Harold Dixon's results (N. of E. Inst. of M. & M. E. transactions "The Rate of Explosions in Gases"). The most notable difference between the two is the fact that Prof. Dixon proved the use of five per cent of moisture to be necessary to obtain the maximum explosive force, whereas Prof. Wheeler does not appear to think that moisture is a necessary factor. There was a time and not long ago, when moisture in the air was considered a great safeguard in a dusty coal mine,—and in the U. S. of America it is still considered a great safegnard by some engineers of standing in colliery management. A saturation of five per cent can only be attained by the use of steam.

Then again we have the factor of coal-dust entirely missing, a factor which is never missing in the working life of a coal-mine, and, in the writer's opinion, if missing renders any experiments particularly in large-diameter tubes, of no practical value whatever.

We have, however, the records of experiments made in large-diameter tubes at Altofts and Liévin in France, and it is surprising that Prof Wheeler does not refer to these. Almost at the conclusion of an experiment at each of these testing-galleries, the speed of the explosion flame suddenly increased, and a portion of each gallery was blown to bits, not at the extreme open end but not far from it. In regard to these two experiments Prof. Wheeler says nothing as to what was the explanation of these tremendous exhibitions of force. He however in the concluding paragraph of his paper, says,—"The fastest speed of flame recorded in any experiment was about 60 metres per second, and was a short duration. This is not of the same order of magnitude as the speed of the *Detonating Wave* in gaseous mixtures. It would not be wise to conclude, however, that the detonating wave cannot, in any circumstances, be developed in mixtures of methane and air at normal temperatures and pressure. On the contrary, in several experiments in the steel tube 30.5 centimetres in diameter and 90 metres long, open at both ends, in which restrictions were introduced at two points (consisting of steel rings, $\frac{1}{8}$th inch thick, which reduced the diameter of the tube to 28.6 centremetres at these points), the development of the detonating-wave seemed imminent. These experiments on the effect of restrictions in the tube or gallery are being continued, together with experiments on a larger scale than those described in this paper, on the propagation of flame in currents of methane and air. As a result of these further experiments, it is hoped to fill the *lacuna* in our knowledge that at present exists respecting the extent to which turbulence of the mixture in whatever way it may be imparted, can increase the violence of firedamp explosions".

The above may be considered a very important paragraph in several regards not the least of which is, that the Professor uses the word "firedamp" only once in No. V section.

Personally the writer is trying to find out what is meant by detonation and how it is created, thus he finds Prof. Wheeler stating that "'the speed attained by the flames during the uniform movement are com-

paratively very slow compared with that of the detonating wave, but slow also compared with the speeds during other phases in the propagation of flame in mixtures wherein the detonation wave normally does not develop, such as are mixtures of methane and air.'' In a foot note he adds, ''The detonation wave constitutes a particular phase in the propagation of flame which occurs only with certain mixtures, chiefly those of inflammable gases with pure oxygen. When the wave has been established in such a mixture, it travels with a permanent maximum velocity which appears to be that of sound travelling in the burning gas, which itself is moving forward *en masse*. The velocity of the wave which differs from each inflammable mixture, is of the order of 1,500 metres per second''.

Methane is an inflammable gas, and therefore when mixed with pure air will it *detonate*? The writer well remembers Prof. Dixon stating that such a mixture would *not* detonate,—he has also read of more recent statements by Prof. Dixon in which he speaks of the detonation of such mixtures, and now we find Prof. Wheeler in reply to Prof. Fearnsides and others explaining the word detonation as used in science, as being easily defined thus, ''It is a particular phase in the propagation of flame which occurs only with certain mixtures, chiefly those of inflammable gases with pure oxygen. The detonation wave is a definite physical constant for each mixture of gases, and travels at a permanent maximum velocity, which is the velocity of sound in the burning gases, which are also moving forward *en masse* with the velocity of sound. That is a definition of the term 'detonation wave' in science.''

This explanation does not explain why an explosion flame such as referred to above as occurring in the Altofts and Liévin long testing-galleries and also at Eskmeals in a three-feet-diameter gallery knocked part of the gallery into junk. Why did the flame in these cases suddenly increase its speed and immediately afterwards ''burst'' the testing tubes close to the open end?

The writer many years ago attended a lecture in London by one of the Siemens staff in the course of which it was explained that to detonate say an explosive the detonator *must* produce a vibration corresponding to a certain musical note, and he also showed the effect of musical notes on electrical flame. Possibly some deep student of the mysteries of electrical phenomena can discover its agency in the Altofts and Liévin demonstrations. Why not?

Before concluding, there is one other point brought out in Prof. Wheeler's paper viz, the diffusion of gases, and the writer knows of no explanation for the fact that after many colliery explosions the majority of the killed are not much burned and sometimes not at all, below the waist. In the olden days, before the ventilation of coal mines was modernised, men often came out of the mine only slightly scorched on the back because they laid down on the floor and allowed the flame to pass overhead. Why should this still occur with modern ventilation or do we assume too much when we speak of the diffusion of gases in coal mine ventilation?

From statements made by members when discussing Prof. Wheeler's paper diffusion does not always occur according to rule and therefore we have at times used our coats as a gentle persuader to hasten the diffusion and to bump a whole in a wall of gas which declined to diffuse quickly. Suggestively the saturated dampness of the air might have something to do with the slow diffusion.

The Central Examiners of the British Mines Department when reporting on the recent examination for First and Second Class Certificate of Competency, make the following comment on the First Class answers:—

''The difference between the mechanical mixing and the diffusion of two gases? Very few of the candidates answered this question satisfactorily. Most of them quoted Graham's law, some correctly, others incorrectly. As a rule the answers displayed the most profound ignorance of the process. There was far too much jargon about intermolecular spaces, bombardment of atoms, and similar expressions, which generally finished up with an illustration, such as—that the diffusion of hydrogen and oxygen into each other results in the formation of water, or that of the gases carbon and oxygen in the formation of carbonic-acid gas; carbon and hydrogen in methane and so on. One of the most simple and correct answers was:—We get mechanical mixture in the breathing bag of a resene apparatus when we mix free oxygen with the generated air to form a mixture (air) to breathe. The injector is the artificial mixing-medium in this case. We get diffusion when firedamp in a cavity in the roof or goaf diffuses into the air current without any external aid and in opposition to its density.''

It is evident from the above quotation that the subject of the diffusion of gases deserves much more serious study than it has heretofore received, though at first sight most people are led to assume that it is a fact and there is nothing to study,—and yet we are not too sure that the man who was writing in his examination answers about intermolecular spaces and the bombardment of atoms, had not got some sound theory at the back of his head originating from a study of electron theories. What is more likely to diffuse gases than electrons constantly on the move?

PERSONALS.

Mr. James McEvoy has returned to Toronto from Mexico where he was examining oil properties.

Mr. J. J. Warren president of Consolidated Mining & Smelting Co. of Canada, has left Toronto for the west. He will cross the Pacific in connection with the Oriental trade of his company, whose mining, smelting and refining co-operations are in British Columbia.

Hon. Edgar N. Rhodes has been appointed president and managing director of British America Nickel Corporation. Mr. Rhodes is Speaker of the House of Commons.

Mr. F. H. Stover of Chatham is at Edmonton en route to Fort Norman where he will have charge of drilling operations for two oil companies.

Mr. Morton F. Stern and Mr. Frederick G. Corning of New York have been appointed directors of Dome Mines Ltd. succeeding Mr. A. H. Curtis and Mr. C. D. Kaeding. Mr. Kaeding was for one time general manager.

Mr. J. S. Bache president of Dome Mines Ltd., is in Toronto for the annual meeting of the company.

Peat Production in Ireland

ROLAND H. BRIGGS, Coulsdon, England.

The very important work carried out by the Canadian Government at the Alfred Bog in Ontario, and the comprehensive schemes for electricity generation and high-tension distribution from the peat areas to industrial centres with which it is hoped to partly meet the fuel shortage in Germany, make the British Government report which has just been published on the winning, preparation and use of peat in Ireland of special interest in the peat-producing countries of the World.

The use of peat fuel in Ireland is not by any means one of the recent activities of the country. For a very long time an average production and consumption probably exceeding 6 million tons of air-dried peat per annum has taken place. Over great portions of the country peat is the only source of fuel supply, and it is considered that the available peat reserves will produce 4000 million tons of air-dried peat. What steps can be taken to make this peat supply serve to the fullest extent the domestic and industrial needs of the country is the problem which the committee of experts which have been considering the matter has endeavoured to solve.

More than a century ago the peat bogs of Ireland were the subject of Government and scientific investigation, but the Treasury was drained by the effects of the Napoleonic Wars, the Irish landlords were themselves too poor to attempt systematic exploitation of the peat areas, and the value of the land if reclaimed for agricultural purposes was reduced by the general low value of agricultural land in the British Isles, caused by the importation of cheap foreign foodstuffs.

The peat supplies of Ireland are, nevertheless, of unusual commercial value owing to the shortage of native coal-supplies, the thickness of the peat deposits, their proximity to industrial areas, and their suitability for draining and land reclamation. The peat areas cover more than 3,000,000 acres, of which a considerable percentage consists of flat deep bogs, estimated to average at least 17 feet in depth. It is considered that the native peat supplies would last for at least 250 years at the present rate of consumption of the whole fuel and power requirements of the country, even if all imported coal was replaced by peat. The pre-war coal production of Ireland was about 88,000 tons, and the imported coal about 4,650,000 tons per annum.

It should be understood that the most important use of peat in Ireland is as a cheap domestic fuel. Whatever steps may be taken to use peat industrially in Ireland, the domestic needs must always come first. The mechanical winning and preparation of peat may, however, in all countries be advantageous for the production of peat for domestic purposes.

Peat is usually cut in Ireland from the end of April to the beginningg of July, and carried home in August and September. The work is carried out at periods which both suit the farm work and the weather. The maximum cutting-period could probably not generally exceed 120 days. Most of the 6 million tons of fuel now used is cut with a wing slane by men, and saved and clamped by the women and children. Wing-slane fuel is cut from the bog with the long axis in a vertical direction, but where the breast slane is used the sod has its long axis horizontal. The latter sods are larger and more regular, and will stand transport with less damage. A small amount of "hand turf" or "mud turf" is produced, this being well-humified peat raised from a bog-hole, mixed with water and spread on the surface of the bog, mixed and puddled by the feet of men and horses, and levelled and parted by hand.

The winning of peat-moss litter is unimportant in Ireland compared with that of peat fuel, but it represents the best example of modern methods in the hand winning of peat as practised in Ireland. A narrow slice 2 ft. wide and 2 ft. deep is cut from the face of the cutting-bank, this being cut in sods 18 in. by 6 in., which when air-dried produces one cwt. of moss litter per lineal yard of face. The cutter can place this amount of raw peat on the surface of the bog without moving from his position and without other help, and an output of 3 tons per day is thus obtained from one man.

The bog is divided by a main road in the centre, with collecting banks 12 yards wide on both sides at 112 yard intervals. Between the banks the bog is divided up by drains 2 ft. wide and 3 ft. deep, and 11 yards from centre to centre, forming cutting banks 100 yards long and 10 yards wide. The narrow slice described above is cut from these faces. The season for cutting moss-litter peat extends through the winter from October until June and the saving and stacking are completed by September.

The various types of peat machines available are described and illustrated in the Report referred to above. The earlier models used in Germany are unsuitable for Ireland owing to the large amount of labour which is necessary to operate them, but it is often necessary to use hand-fed elevators in Europe instead of dredgers because of the number of logs and branches which are met with. In the Irish bogs the peat is singularly free from logs, except at the edges.

In the most modern electrically-driven machines the raw peat is excavated and elevated from the bog, is macerated and mixed by means of rotating and fixed knives and a single or double-screw conveyor, which forces the peat through a nozzle or nozzles in a stream, which is cut into lengths for sods, these sods being carried away by a conveyor and deposited on the bog. This only leaves one operation still to be done in the peat producing, that is, the collection and stacking of the air-dried peat.

Most of the machines used in Germany and Austria have excavators of the ladder-dredger type and work on an inclined face, so that the face when cut at a proper slope is in equilibrium. Continuously-rotating excavating-buckets fixed on a chain are used. The sods produced are about 10 x 10 x 40 cms., and the conveyor usually consists of a number of plates resting on rollers, each plate receiving one sod. The conveyor may extend at right angles to the cutting face for a distance of 60 to 120 metres. This system is considered more suitable for Ireland than the Canadian method of transferring the macerated peat to a spreading machine by means of buckets on an overhead telpher, as the difficulty in Ireland is to provide sufficient suitable labour at any particular point, and the latter system is thought to require more operative labour, although it has the great advantage of giving a much larger drying-ground.

While economy in the labour required appears to be given by the automatic machines described, one of these requiring only 3 to 5 men for the excavating and spreading of 76 tons of air-dried peat per day, they have the drawback that the width of the drying ground is limited

by the length of the conveyor, which as mentioned above may be from 60 to 120 metres. A narrow width of drying ground means that a greater length of cutting-face must be developed for a given output per season, and a larger area of bog must be laid out for working in consequence. The narrow drying-ground also limits the amount which can be cut off per lineal foot of the working-face per annum, and this results in a higher capital expenditure on the light railway required.

It is suggested that another labour-saving appliance which should be used with the automatic peat machine is the belt conveyor and stacking machine for collecting the air-dried peat into stacks adjoining the drying ground.

Automatic machines for peat-winning in Ireland are advocated because sufficient labour for hand-winning is not available, and a longer season can probably be worked when machines are used; because the work may proceed by night as well as by day, cheap electric-light being available; because machine peat dries more rapidly and is less affected by rain than slane-cut peat; because machine-cut peat shrinks more than slane-cut peat and has thus a higher calorific value per cubic foot, a very important item for transport and grate areas; because machine-cut peat will stand handling better; and because peat machines can cut for the whole depth of a deep bog, so that a more uniform product is obtained, an important matter for steam-raising and gas-producing.

It has been argued that the surface of the bog will not support the weight of the machines, and that their heavy initial cost and the difficulties caused by stumps and tree roots make them unsatisfactory, but the consolidating effect of proper drainage makes the bog surface suitable for supporting the weight of either rails or caterpillar tractors, capital costs are balanced by savings in labour, and the Irish bogs except at the margin are very free from obstructions.

From a number of figures which have been collected it has been shown that to win mechanically 100,000 tons of air-dried peat per annum for 100 years would require a total area of 5000 acres, 20 feet deep, which area includes the necessary drying-ground, transport, stacking and working areas, and for this output 13 to 14 automatic machines would be required and about 130 men and 400 women and children from February to the end of September, with 35 men only for the remainder of the year. It is considered that .77 tons of air-dried peat will equal in value 1 ton of coal as delivered in Dublin, that is, with an average calorific value of 11,000 to 12,000 B.th. U. per lb. The by-products of peat place it in a more favorable ratio to coal if both fuels are gasified in a gas producer.

As the area of the peat bogs of Ireland is one-seventh of the whole land-area of the country, their drainage for peat production has an important bearing on the agricultural resources of the island. The lime required after the bogs have been drained and stripped of the peat is present, close to the bogs, in ample quantity, and good crops of potatoes, barley, mangolds, parsnips and carrots can be seen growing in Ireland on reclaimed peat-stripped bog-land. It is obvious that the increase in the value of the land for agricultural purposes can be subtracted from the cost of winning the peat supply.

The recommendations of the Committee include the suggestion that the State should purchase a large peat-bog capable of producing at least 100,000 tons of air-dried peat per annum, that the bog should be drained both for peat-winnings and agriculture, that the various electric-driven plants should be tested under working conditions, that an electric power-station should be set up, the generators being driven by gas-engines operated by peat producer-gas, and that the recovery of the by-products should be practised in the most efficient manner, that an electro-chemical industry depending on cheap electricity should be started to prove the economy of the power system, and that the necessary dwellings for the employees should be erected. While no such comprehensive scheme as the above has yet been put into operation, experiments with peat machines are being continued and the results eagerly watched.

ONTARIO MINING ASSOCIATION MEETS AT COBALT.

The annual meeting of the Ontario Mining Association was held at Cobalt from June 16th to 18th. At the end of two years the Association reports a membership of 41 companies, representing a gross capitalization of $175,000,000. The business meetings at Cobalt were interspersed by local motor-drives and visits to the mines. On Saturday the visitors, as guests of the Temiskaming Mine Managers' Association visited the ancient Wright Mine on the Quebec shore of Lake Temiskaming.

The proceedings of the Association were not made public. The mining companies represented by their officers included the following. Algoma Steel Corporation, Bailey Silver Mines, Beaver Consolidated Mines, Cobalt Reduction Company, Coniagas Mines, Coniagas Reduction Company, Crown Reserve Mining Company, Dome Mines Company, Dominion Reduction Company, Edwards & Wright, Limited, Geo. H. Gillespie & Co., Henderson Mines, Ld., Hudson Bay Mines, International Nickel Company, Keeley Silver Mines, Kerr Lake Mining Company, Kirkland Lake Gold Mining Company, Haileybury Frontier Mine, Lake Shore Mines, La Rose Mines, Lightning River Gold Mines, McIntyre Porcupine Mines, McKinley Darragh-Savage Mines, Miller Independence Mines, Mining Corporation of Canada, Mond Nickel Company, Nipissing Mining Company, Northerown Porcupine Mines, O'Brien Mine, Ontario-Kirkland Gold Mines, Petersen Lake Mining Company, Teck-Hughes Gold Mine, Temiskaming Mining Co., Trethewey Mining Co., Wright-Hargreaves Mine, Aladin-Cobalt Co., British America Nickel Corporation, Dominion Improvement & Development Company, Kirk Gold Mines and Lakeview Gold Mines.

Invited guests included the Minister of Mines and his Deputy, the Mining Commissioner, the Provincial Geologist and Chief Inspector of Mines, and a number of prominent mining engineers from Toronto and Northern Ontario.

The officers elected for the ensuing year are as follows. R. B. Watson, General Manager of the Nipissing Mining Company, president; C. V. Corless, General Manager of the Mond Nickel Company, first vice president; J. P. Watson, second vice-president. The Directors include E. Hibbert, A. D. Miles, George Cowie, H. P. Depencier, J. P. Bickell, A. Fasken, J. G. Dickenson, F. L. Culver, R. C. Coffey, G. C. Bateman and George H. Gillepsie. Mr. Balmer Neilly was reappointed Secretary. Messrs. Miles, Culver, Watson, Bickell, and Fasken, with the Secretary, form the Executive Committee of the Association.

Oil Prospecting in the Great Plains and the Northwest

New Geological Survey Reports on Oil and Coal.

Part B. of the Summary Report of the Geological Survey for 1920 contains a number of reports of progress on the geological study of possible oil-bearing formations in the Great Plains and in the Mackenzie drainage area. These will be of general public interest, as will also be some papers on coal horizons in Saskatchewan and further west. A list of the reports is as follows:

Mesozoic of Upper Peace River, British Columbia.

F. C. McLearn reports that the lower member of the Bullhead Mountain formation in the district covered by his reconnaissance is not promising as a coal producer, some seams noted being too thin and of too poor a quality to be of commercial importance. The upper member requires to be prospected, and it is suggested has important possibilities as a coal-bearing formation.

While the district was too large to be covered adequately in one season, the evidence gathered is not favourable to oil possibilities, and geological evidence so far as collected does not indicate any place where drilling for oil would be justified. The structure is unfavourable, there has been much faulting and the rocks have undergone much metamorphism, as indicated by the high carbon content of the coal, where it is exposed.

Placer gold found on bars on the river flats is not thought to have a local origin, and enrichment at bedrock is not to be expected. A very small amount of platinum has been found with the placer gold.

The writer points out in the reason for the frequency of landslides in this district,—and directs the attention of railway engineers to the comparative stability of the Pleistocene sands, as opposed to the mobility of surface layers of sliding boulder-clays.

Upper Elk River, British Columbia.

J. R. Marshall reports on the coal-bearing formations of the Upper Elk River, British Columbia. Lower Cretaceous rocks in the area examined contained important seams of bituminous and semi-bituminous coal, particularly in the Kootenay Formation. As many as 22 distinct seams, yielding a thickness of 175 feet of coal are reported. Seams from 10 to 15 feet thick, and some as thick as 20 ft. are present, and one section showed 89 ft. of coal in 3,386 ft. of measures. Another section, measured by Dr. Dowling, gives 175 feet of coal in 1,169 ft. of measures. A sample from a 12 ft. seam gave upon analysis 1.2 moisture, 8.2 ash, 26.6 volatile and 64.4 percent of fixed carbon. The seams pitch from 35 degrees to 50 degrees, the coal measures occurring in a synclinal trough. Two main sections, the Elk River and the Fording River are mentioned. The mining of the coal is said to be possible without serious difficulty, and the valleys of the Elk and Fording rivers afford practical routes for a railway.

Review of Prospecting for Oil on the Great Plains.

D. B. Dowling reviews prospecting operations for oil in Alberta in five distinct structural provinces. The work is being done by companies with sufficient capital to complete individual undertakings and to retain a staff of expert geologists. The results of drilling, may therefore, states Dr. Dowling "be looked forward to with more confidence than the sporadic work of 1913." A very small percentage of the 1913 holes reached horizons in which there would be some chance of finding oil, and many of the failures were made on unfavorable structures.

Mr. Dowling comments on the presence of oil in rocks of Lower Cambrian age at Waterton Lake and Cameron Brook, and quotes from Dawson in the Summary Report of 1898, suggesting a possible overriding of Cretaceous rocks by very ancient rocks "probably of Lower Cambrian age". A later opinion of Daly suggesting an overthrust of 40 miles is quoted, and the oil is suggested to have originated in the Cretaceous through the action of heat. Mr. Dowling states the petroliferous character of the lower part of the Cretaceous in the foothills is proven by actual discovery further north, and he suggests the oil that is found in the Lower Cambrian was introduced as a vapour.

Mr. Dowling's report deals in detail with each drilling operation, and it is not possible to usefully condense it.

Underlying Seams of the Souris Coal Field, S.E. Saskatchewan.

Mr. Dowling reports on underlying seams in lignite area of Saskatchewan known to exist below the seams naturally exposed and worked at Estevan, Bienfait and Taylorton. These seams are covered by a mantle of drift, and the coal-seams, where reached by wells, have shown a continuity in horizon but a great variation in thickness.

Great Slave Lake Area.

G. S. Hume reports on study of the north shore of Great Slave Lake during the season of 1920, continuing the work of A. E. Cameron in the seasons of 1916 and 1917. Material collected by Cameron and others included the whole Devonian as found in this region, and it was desired to discover what might be available between the base of the Devonian and the top of the pre-Cambrian, for which purpose the north Arm of Great Slave lake seemed to be most favourably situated.

Raised beaches, indicating successive lowerings of the lake level were noticed. The Silurian exposures on the North Arm are described, together with some of the fossils obtained.

In regard to oil possibilities, at Windy Point a number of oil seepages occur from the Presquile formation of Middle Devonian age. The Presquile formation is a porous dolomite containing caverns lined with dolomite crystals and partly filled with a heavy thick oil. Films of oil are found on the water of the lake, and, on hot days, oil oozes from the rock and stains the face of the exposure. "There is no doubt," states the Report, "that this horizon contains oil in quantity, but the outcrop of an oil horizon cannot be expected to be a very favorable location from which to obtain commercial quantities of oil by drilling." The possibilities of finding oil at some distance inland from Windy Point are as yet unknown, but from what is known of the regional structure, the Windy Point anticline is a local fold on a much larger structure dipping southwestwards. "If favorable structures can be located in this region with a cover of Simpson shale, the possibilities of finding oil would seem to be very good."

The presence of sulphur springs near the outcrop of the Presquile dolomite is discussed, and is regarded by

the writer of the report as an unfavorable indication of the presence of oil of light specific gravity.

Oil-bearing Rocks of Lower Mackenzie River Valley.

This is a full and well-illustrated report by E. M. Kindle and T. O. Bosworth, from which extended extracts will be given in a later issue of this journal. A sketch map, showing approximate geological structure of the Norman-Good Hope area, and a sketch map showing the geology along the Mackenzie between the Ramparts and the Delta, are included, and some interesting photographs. A table of the formations, with thicknesses, and a correlation with Great Slave Lake and Upper Mackenzie formations, is also given. Formations which may contain oil are numerous. The oil-sands are stated to contain an oil that is light and colourless, with an odour indicating a paraffin base and high gasolene content. Numerous oil-seepages are mentioned, and gas is being given off from all places where oil seepages were noticed. In addition to the oil-sands there is a large area of the Devonian that contains highly bituminous limestone. "At depth, under favourable structural conditions, it is possible that some of the beds in this series (Beavertail limestone) may be found to hold accumulations of fluid oil." Enormous areas of bituminous shales are mentioned. One outcrop, between Bear Mountain and Carcajou, is a hundred miles long, and in a number of places the bituminous shales are undergoing slow combustion at their outcroppings.

In regard to structures favourable for oil accumulations, the Report states, "the conditions conducive to the formation of oilfields are here very favourably fulfilled."

> "Extending over a large area we have 1,000 feet or more of highly bituminous limestones and shales, from which an immense quantity of petroleum might readily be generated. And overlying these beds, there are 2,000 or 3,000 feet of clay-shales and sandstones from which numerous seepages of oil arise. Finally, this mass of petroliferous deposits is traversed by large, bold, anticlinal folds.
>
> The high parts of the anticlinal hills are not now territory favourable for oil, since denudation has removed the oil-bearing formations from them. But these main anticlines pitch up and down, and probably in some parts of the low flat land, on the west side of the river, perhaps along the prolongation of these axes of folding, similar great arches of the petroliferous formations may be present underground. Such would be ideal situations for the accumulation of pools of oil.
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> Away from the crests, the dip slopes of the main anticlines present considerable possibilities; for changes in dip or porosity, faults, and minor flexures, may result in the accumulation of many oil pools at quite a distance from the main anticlinal axes.
>
> Apart from the large folds, the minor undulations also may prove important. In such deposits as these it is probable in any case that oil accumulations will be formed. If large structures are not available the oil will find the small ones. These smaller structures, similar in dimensions, for instance, to the anticlines of the Oklahoma and Texas oil fields, probably occur throughout the territory, both on the dip-slopes and also at a distance from the axes of the main folds."

The Discovery Well at Norman was put down on a location chosen in 1914 "not as a spot where great production was hoped for, but as a site where a hole of moderate depth could not fail to penetrate the petroliferous formations which had been discovered." Whether this well will yield a steady production or not is not certain, but the Report makes the most important statement that "it has already demonstrated the prospect of important oilfields in the region." The oil from the well is of light colour, low specific gravity, high gasolene content, and low cold test.

The sum of the geological evidence, together with the result of the test well, "indicates an extensive oil region in which a number of oilfields may occur." "The capacity of the wells and the productivity of the fields are matters beyond present calculations. *But they are likely to be comparable to those of other Paleozoic oil-fields.*"

This preliminary report, which will probably be followed at a later date by a new memoir on the oilfields of the Mackenzie District, is one of the most important reports of progress that the Canadian Geological Survey has issued in many years. Copies can be obtained by application to the Department of Mines at Ottawa.

"Mining & Engineering Record" of Vancouver for May contains a compilation of information regarding oil in the Canadian northwest by the Editor, Mr. E. A. Haggen, and maps of the Athabaska river and Mackenzie river Basin that contain a great deal of local detail. Mr. Haggen is to be congratulated on this number.

Richard Lewis Lloyd, vice-President of the Dwight & Lloyd Sintering Company, and also of the Dwight & Lloyd Metallurgical Company, was recently honoured by the degree of Master of Science from Washington University at St. Louis, Miss. In conferring the degree, the Chancellor referred to Mr. Lloyd as having been trained at the Washington University and as associated with many improvements in metallurgy, particularly in the smelting of copper. Mr. Loyd has also shared in the development of the Dwight & Lloyd sintering apparatus, which because of its possible application to the beneficiation of Canadian iron-ores has attracted much attention in Canada.

HAMILTON'S GEAR BOOK.

The Hamilton Gear & Machine Company of 62-100 Van Horne St. Toronto has issued a useful book on cut gears, complied by Chester B. Hamilton, Jr. containing formulae, tables and interesting data on gears, and showing the equipment of this up-to-date house. The book is not a catalogue, but is really a modern handbook on gears, their construction and materials used in their manufacture, and heat-treating. The treatment is so technically excellent and so complete as to indicate that this Canadian firm knows its business thoroughly, and is equipped to give accurate and dependable service. The company was first organized in 1911, and the growth of the business has necessitated successive enlargements of the plant. An organization which did good work in munitions manufacture from 1914 throughout the war has been retained intact. The book is one that should prove useful to any mechanical engineer having to do with gears, or interested in a choice of gear materials.

"CANADA'S MINERALS."

(From the "Financier", London.)

With interest on this side restricted to only a few companies it is not surprising that the mineral potentialities of Canada have not received that measure of attention which is justified by the facts. The explanation is, perhaps, largely due to unavoidable delay in the compilation of statistics sufficiently up to date to command the attention of the speculative investor, in conjunction, as we have said, with the fact that the facilities for exploiting capital in Canadian mining enterprises are so extremely limited. This state of affairs, however, is being remedied by the progressive policy of the Canadian Government through the valuable intelligence service which has now been instituted in the City, and which may aptly be described as a veritable bureau of information regarding all matters pertaining to Canadian trade and industry.

As there are tangible grounds for the belief that British capital will be attracted more and more by the mineral possibilities of Canada, special interest atttaches to the preliminary report now available on the mineral production of the Dominion for the year 1920. This document is based upon direct returns received from the mines and smelters, and although these are not complete, sufficient data are available on which to base a fairly accurate record.

Lower Outputs with Enhanced Values.

In reviewing the industry as a whole, the custom is adhered to of expressing the mineral production in terms of dollars or total values. There has been a wide range in the prices of many metals during recent years, and the continuation of high prices for many products has, of course, resulted in greatly increasing the total value of the mineral production, even though the actual quantities of minerals obtained show a decline. As an instance, the average price of coal at the mine has increased from 2.49 dollars in 1913 to 4.65 dollars in 1920, so that the same tonnage of coal as was produced in 1913, viz., 15,012,178 tons, would have a value in 1920 greater by over 32,000,000 dollars.

The rapid strides which have been made since the war is shown by the fact that the total estimated value of the mineral production in 1920 of 217,775,080 dollars constitutes a record, being an increase of 41,077,690 dollars over the 1919 production, or 23 per cent, while compared with 1918, the previous maximum year, the increase was 6,473,183 dollars or 3 per cent. This interesting fact has thus far been somewhat obscured by the economic depression, falling prices and restriction or complete cessation of operations which characterized the closing stages of the year.

Gold Recovery Maintained.

The outstanding features of the period under review are the quick recovery in the production of copper, nickel and zinc among the base metals and in the output of coal and other non-metallic products. Only a very modest increase is shown in the total gold production, which amounted to 766,912 ozs., valued at 15,853,478 dollars, but the point is made that Canada occupies the almost unique position in being perhaps the only gold-producing country which has not shown a serious falling off in the production of the precious metal. To the aforesaid total Ontario, needless to say, was by far the largest contributor with 564,959 ozs., or over 73 per cent of the total production of the Colony. Now the active operations have been resumed in the Kirkland Lake district the assumption is that this province will easily maintain its pre-eminence.

As already indicated in the production of the base metals and coal, the period under review established a record. The total output of copper amounted to 40,577 tons, against 37,527 tons previously, which, at the average price in New York of 17.456 cents, would be worth 14,166,479 dollars. With the exception of silver it has to be remembered that metal prices were well maintained throughout the first nine months of the year copper standing slightly above the average, lead at about 50 per cent and zinc at 30 per cent in excess of the previousyear's average. Since then, of course, there has been a serious crash in metal prices, and as in other parts of the world these industries have been faced with a corresponding curtailment and suspension of operations pending an exhaustion of accumulated stocks and a market demand to restore higher prices, or alternatively until the vexed problem is solved by reducing the costs of production to the point of successfully meeting the prevailing prices.

Great Latent Possibilities.

While the report does not disguise the fact that present conditions foreshadow a considerable shrinkage in mineral production for the current year, the hope is expressed that it will rapidly be followed by an industrial activity based upon more healthy conditions of price and profit. While Canada has her domestic problems in respect of supplies of iron and petroleum and distribution of coal, it is pointed out that the great basic factors of her enormous mineralized areas, her great known resources in coal, nickel, copper, gold, zinc, asbestos and other metals too numerous to specify, and her infinitely greater latent possibilities should never be lost sight of. It need scarcely be added that there is evidence that the British investor is becoming more alive to the fact.

ONTARIO'S MINERAL OUTPUT.

The report of the Department of Mines of Ontario covering the first three months of 1921 shows a great falling off in production of metals as compared with the previous year. Nickel, copper, silver and iron were produced in relatively small quantities owing to market conditions. Gold production was down owing to shortage of power during the period. The present output of gold is however very much larger and the report for the three months ending June 30th will show a big increase. There has recently also been some revival of activity at Cobalt mines though the price of silver is still low.

STEEL FIRM OPENS AT COBALT.

The well-known English steel firm of Samuel Osborn (Canada) Ltd., has just opened a branch office and warehouse at Cobalt, to take care of the Northern Ontario mining business. Mr. Hubert S Southworth is the manager at Cobalt. This firm, which has its headquarters in Montreal, has just removed its Toronto office and warehouse to 126 Wellington Street, West, Toronto. The Toronto manager is Mr. H L. Usborne

THE LATE GEORGE BLAKE WALKER—COAL MINER AND SCIENTIST.

By the death of George Blake Walker, at the age of 67, British coal-mining loses one who was a leader in all improvements in the methods of coal extraction and utilization. His grandfather, father and himself were successively in charge of the Wharncliffe Silkstone Colliery from 1853 until within a few years ago. In connection with this colliery undertaking many of the now approved modern practices in coal-mining were first tried. The first by-product coke-ovens in the Midlands Coalfield (if not the first in Britain) were erected by the Simon-Carves Company at Wharncliffe Silkstone Colliery about 1890, and at this colliery, coke-oven gases, after extraction of the benzol and other by-products, were used to drive gas-engines, and to provide motive-power for the air-compressors and electric-lighting. Coal-cutting machinery was installed at a very early date in these collieries, and at a neighbouring colliery, Mr. Walker was instrumental in introducing the use of the first electrically-operated coal-cutter to undercut a seam under two feet in thickness.

Mr. Walker was responsible for the introduction of the first oxygen-breathing apparatus into British coal-mines, and the Tankersley Rescue Station, for which he was also chiefly responsible, was the first in Britain. He was also a pioneer in the introduction of pit-head wash-houses, and took a lively interest in all housing schemes for coal-miners.

His labours for the scientific advancement of coal mining covered a long period. He was a Fellow of the Geological Society, and was the first lecturer in coal-mining at Firth College, Sheffield. His exertions in the formation of the University of Sheffield, and particularly in its coal-mining activities were recognised in 1918 by the honorary degree of Master of Engineering from that University. He was one of the original members and an ardent supporter of the Midland Institute of Mining & Mechanical Engineers, being President from 1896 to 1898, and Honorary Secretary until 1918. He was the first recipient of the Peake Medal for conspicuous service to the mining industry. In 1918, his great services were recognised by his election as President of the Institution of Mining Engineers, and he also received the Telford Medal and premium from the Institution of Civil Engineers, of which he was a member. He was a member and President of the Sheffield Society of Engineers and Metallurgists.

THE LATE GEO. BLAKE WALKER.

Mr. Walker lived and worked among his employees from a boy, and in 1916, after 42 years continuous residence and service with the Wharncliffe Silkstone Collieries, his workmen presented him with a portrait in oils as a token of their esteem. The Wharncliffe Silkstone Colliery is historical in that it had the first checkweighman appointed under the Coal Mines Regulation Act, and it was the first colliery to have a miners' union.

As a consulting mining-engineer, Mr. Walker visited Australia and Canada on numerous occasions, and his health was impaired by hardships experienced in a blizzard while examining coal properties in the Rocky Mountains in 1909. He made two reports on the properties of the Dominion Coal Company in 1904 and 1907. He visited Canada in 1919 again.

As a pupil of Mr. Walker's, and as one of many who received many personal kindnesses, and wise direction, encouragement and help in mining studies, from a man who always regarded mining education as a life mission, the Editor desires to express his gratitude for the example of a good man, of great scientific attainments, actuated by the highest ideals, whose probity was never challenged. In addition to his eminence as a mining engineer, Mr. Walker was a musician and composer, and published several volumes of verse. It was a privilege and an honour to be intimately acquainted with such a man, whose comparatively early passing will cause regrets in the many quarters of the world where his former employees and pupils are scattered.

NORTHERN ONTARIO ORES DISPLAYED IN TORONTO.

A remarkable and attractive display of gold and silver ores representative of the mineral wealth of Northern Ontario, is on exhibition in the G. T. Railway ticket office window King and Yonge streets, Toronto. This unique display is arranged by Mr. E. R. Fairey in an endeavor to bring more forcibly before the people resident in, and visitors to Toronto, the tremendous activity now taking place in the gold mining districts of the Province. Mr. Price Green, Commissioner of Canadian National Railways, secured for this display the very spectacular ores from the Creo us Mine showing the gold as it is found in the quartz. This ore assays two hundred and fifty thousand dollars to the ton, and is well worth seeing. Other ores are from the McIntyre Porcupine Mine, Atlas Mine of West Shining Tree district, and Silver ores from Cobalt and Gowganda.

METHODS ADOPTED TO OVERCOME COAL SHORTAGE DURING THE BRITISH COAL STRIKE.

(By our English Correspondent.)

On March 31st. last the coal mines of Britain closed down for the usual Easter holiday, at the time of writing, ten weeks later, they have not yet reopened. The miners call it a lock-out, the owners say it is a strike, and the wise man calls it a stoppage. It has been conducted with remarkable forbearance on all sides, and is the result of economic circumstances rather than of unreasonableness on the part of anybody.

Very briefly it may be explained that at the end of Government Control the coal industry in Britain found itself in a state of complete bankruptcy, instead of the most profitable concern which it had been before the War. In 1913 the production of the country was over 287 million tons, of which nearly 98 million tons was exported or used for foreign bunkers. In 1921 the annual rate of production before the stoppage had fallen by at least 70 million tons, and the coal export to one-third of the 1913 figure.

The price of coal had increased by so large an amount that it was throttling the very existence of the iron and steel-producing trades, and other industries where large quantities of coal were required. The coal owners therefore determined to bring costs down to an economic level. This was a simple matter in those areas where coal is reasonably easy to procure, but an almost unanswerable one where the difficulty of getting the coal is so great that that much of the available money is swallowed up in non-productive wages and materials.

Geological difficulties and differences have made the coal stoppage, and the difference of opinion between the owners and miners only relates to the method with which those difficulties should be met. The miners say a national pool of profits and wages, by means of which the earning power of the various coalfields would be levelled up, would solve the question, but the owners, with the effect of Government war control of most industries still fresh in their memories, say such a solution is economically unsound as it would result in certain waste and inefficiency.

The natural differences in the coalfields are very marked. In some areas it is fairly easy to get the coal by mechanical methods, the seams are of fair average thickness, and the mines not unduly wet. In other districts on the contrary great difficulties are met with. Excessive squeezing of the strata has resulted in the formation of lateral cracks in the coal full of very fine dust which is discharged into the atmosphere when the coal is obtained and forms a highly explosive mixture. The coal cannot be undercut easily by machinery as it usually falls and jams the machine, and the quantity of timber and steel required for supporting the roads and the number of men needed for placing it is many times as great as in other collieries. Gob fires are particularly prevalent, or water is present in such large quantities that very heavy pumping-charges are incurred. These and other difficulties make coal getting a very expensive matter, yet the price obtainable for the coal is the same as that for coal which can be mined almost as easily as in an outcrop. Hence the differences in wages proposed by the owners, and the very natural resentment of those miners who are required to accept a heavy reduction as compared with their fellows in the better paying mines.

For twelve weeks the three thousand collieries of Britain have been idle, although it has been through its coal supplies that the industrial prosperity of the country has been largely built up. And how, it may be asked, has a manufacturing nation been able to exist for so long a period without this most essential commodity? How has it been possible to continue its ordinary business, its football and international cricket and golf? How could a record "Derby" on June 1st draw together so vast a concourse of the horse-racing public?

The answer may be given in half a dozen words. Organization, trade, slump, oil and foreign coal, given in that order of importance. The coal stoppage had been threatened for a long time, and as far as it was possible industrial concerns and public utility companies had been building up stocks. The nation had become drilled during the War to put up with almost anything and to do without almost everything, and a mild form of war control, was immediately put into force.

The railway train service was cut down with a most drastic hand, and the tramway services in a similar manner. All late trams and trains were cancelled, and only a meagre service run during the rest of the day. All excursions, cheap fares, special trains and the like were abolished. Outside illuminated signs were stopped, and street lighting drastically curtailed. Coal was strictly rationed and issued out to householders with a most sparing hand, and severe penalties against hoarding were put into force. Bakeries and similar businesses were requested to undertake the cooking of meals for private families, so that fuel should be conserved, and a general appeal was addressed by the Government to the public to save coal, gas, oil and electricity in every possible way.

This action, throughout the length and breadth of the land, had a marked effect on the national coal consumption, and merely inconvenienced, without in any way hurting, the public. Another factor which has greatly helped people to get through the difficult time has been the remarkably dry and warm weather which has lasted practically the whole time, and which has made domestic needs very much less than they generally are in the early springtime.

The second reason for reduced coal consumption is the trade slump, which seems to have affected all countries about equally. The tin mines of Cornwall have been closed for months, and only two or three are pumping, some iron mines are only working three days a fortnight, many engineering and textile works are only running three days a week. All are obviously using far less coal for light and power than usual. The "daylight saving" arrangement also greatly helps in reducing lighting requirements.

Oil has also been a factor in neutralizing the effect of the coal stoppage, the very large number of oil-driven or oil-fired ships having been running as usual, and on land, much of the freight and passenger traffic normally carried by the railways having been diverted to the highways. A certain number of railway locomotives have been converted to use oil-fuel, and help to augment the coal-fired trains, and various power stations, which generate the power for electric railways and tramways have been rapidly fitted up with oil-burning apparatus.

Public and vital services, such as the railways, hospitals, food-preserving industries, and certain other necessary organizations were supplied by the government with imported foreign coal, which is understood to have been received from both America and Europe. No figures are available with regard to the total amount of foreign coal so far imported, although it was stated in Parliament last week that the amount of "reparations" coal received to that date was 94,000 tons.

While these are the means which have enabled the nation to carry on for so long a period, it is not for a moment suggested that the coal stoppage has been anything less than a disaster of the first magnitude. There is no blast furnace working in Britain today, most of the steelworks are closed, and other trades are on short time or are nearing the end of their resources. Industry is now almost at a standstill and unemployment increasing by leaps and bounds.

Nevertheless there is an undercurrent of optimism in the minds of most far-seeing people. It has been felt that something was necessary to bring the nation back to realities from the false position it had drifted into during the War, and the subsequent trade boom of 1920. Some industrial upheaval seemed necessary to carry us back to a firm economic foundation from which it would be possible to compete successfully in the markets of the World. Firms that had written up their capital, have, in some cases, had to write it down again, and unskilled workers or inefficient executives who had risen to lucrative positions through war-luck rather than ability are having to find their level again during this searching time.

Thinking people therefore hope that when the coal stoppage and other industrial differences are settled, it may again be possible to see life and industry from a sane viewpoint, to remember that the burden Adam left us has not yet been removed, that the printing of paper money does not create wealth, and that the test of a nation's industrial capacity is the position it can hold in open competition with the other great manufacturing nations of the World.

MONTREAL METAL QUOTATIONS.

Following are the fair average prices for ingot metals (in less than car-loads) at Montreal:

	June 16	June 22
Copper, Electric	18	17¾
Copper, Casting	17¾	17½
Tin	37	36
Lead	6¾	6½
Zinc	7¼	7¼
Aluminum	31	31
Antimony	7½	7¼

TORONTO METAL QUOTATIONS.

Below are the fair average prices for ingot metals (in less than car-loads) at Toronto:

	June 22
Copper, Electric	17
Copper, Casting	16¾
Tin	39
Lead	7
Zinc	7½
Aluminum	30
Antimony	9

(Unchanged from previous week.)

CROW'S NEST PASS COAL COMPANY'S REPORT FOR 1920.

The Crow's Nest Pass Coal Company held its annual meeting at Fernie recently, and the improved standing of the Company may be gnaged from the following comparisons:

	1920.	1919.
Coal Production (tons)	779,942	536,543
Coke "	75,928	63,915
Current assets	$1,303,673	$936,595
Current liabilities	412,987	328,473
Inventories	222,131	240,604
Cash	541,128	281,294

A decrease in inventories and increase in working capital are unusual features in annual reports at this time, and the report should please the shareholders.

W. R. Wilson was re-elected President and General Manager, and several changes were made in the directorate.

TORONTO MINING STOCK QUOTATIONS.

Quotations on Active Stock on Standard Stock Exchange Quotations for Week Ending 18th June 1921:

	High	Low	Last
SILVER			
Adanac Silver Mines, Ltd.	⅞	¾	⅞
Bailey	2	1½	1⅝
Beaver Consolidated	30½	30	30
Chambers-Ferland	6¼	6¼	6¼
Coniagas	1.65	1.65	1.65
Crown Reserve	12½	10	10
Gifford	⅞	¾	¾
Hargraves	1	1	1
McKin.-Dar.-Savage	20	19	20
Mining Corp. of Canada	1.22	1.10	1.12
Nipissing	4.95	4.75	4.75
Peterson Lake	5½	4½	5
Silver Leaf	1¼	1¼	1¼
Temiskaming	21½	20¼	21½
Trethewey	16½	16	16
GOLD			
Atlas	23½	22	23
Boston Creek Mines	9	9	9
Dome Lake	4½	4¼	4½
Dome Mines	19.75	18.75	19.50
Gold Reef	3¼	2¾	3¼
Hollinger Cons.	7.10	7.00	7.06
Keora	12	11	11
Kirkland Lake	45	43½	44
Lake Shore M. Ltd.	1.20	1.15	1.20
McIntyre	1.95	1.87	1.90
Newray Mines, Ltd.	6	5½	6
Porcupine Crown	16	14	15¼
Porcupine V.N.T.	19½	17	19½
Preston East Dome	2⅞	2½	2⅞
So. Keora	16½	16	16½
Schumacher	21	20½	20½
Skead	33	31	31½
Teck-Hughes	12½	11½	12
Thompson Krist	1½	1¼	1½
West Dome	6	5¾	6
West Tree Mines Ltd.	3¼	3	3
Wasapika Consol	8½	8⅛	8½
Wakenda	3½	3½	3½
OILS			
Rockwood Oil, Gas	2	2	2
Vacuum G.	8	7¾	8

Northern Ontario Letter

THE SILVER MINES.

The Cobalt Field.

During the third week of June, 16, 17, and 18, the annual meeting of the Ontario Mining Association was held in Cobalt. More particular mention is made elsewhere in this issue.

Although some of the mines are still closed, yet the silver-mining industry of Cobalt seems to be re-entering another period of prosperity. The four larger mines are producing at full capacity, while a number of smaller mines are also producing at a steady rate. Of the medium-sized mines which still remain closed, it is impossible to tell when they will be re-opened. It is evident, however, that a continued decline in the cost of operation is steadily bringing the date closer when all these mines may again join the producing list.

The Nipissing Mining Company will disburse a dividend of 3 per cent on July 20th to stockholders of record June 30. This will call for the distribution of $90,000. As regards production, an average of close to $150,000 monthly is being maintained. The output in May amounted to $142,036, as compared with $142,610 in April. The new headframe is now in use at shaft 73, replacing that destroyed by fire some weeks ago.

In spite of the curtailment of work at the silver mines during recent months, the figures of the Ontario Bureau of Mines shrow an output of 2,106,045 ounces during the first quarter of 1921, as compared with 2,280,665 ounces during the first quarter of 1920. Ten mines contributed to the output, these being the Nipissing, Mining Corporation, O'Brien, Coniagas, La Rose, Miller Lake O'Brien, McKinley-Darragh, Beaver, Trethewey (Castle) and Bailey. During the quarter, the Beaver closed down and has not re-opened, while the Mining Corporation also closed down early in March, but has resumed production at full capacity and is treating a larger daily tonnage than ever before in its history.

W. R. Sweeny, secretary of the Bailey Silver Mines, was in Cobalt during the past few days and expressed himself as being very optimistic about achievements in the Bailey mine as well as the Company's customs mill. Under the management of G. C. Bateman, expenses at the mill are stated to have been reduced nearly $3,000 monthly.

A break in one of the parts in the mill on the O'Brien Mine caused a loss of nearly a week in milling time and promises to reduce the figures of production as for month of June, but production is now under way at normal rate.

Negotiations are under way between one of the producing companies and the controlling interests of the Silver Leaf Property with the object in view of buying the Silver Leaf. Details are withheld for the time being, but it has been intimated to the Journal that further information might be available within the course of another week or two.

A small force of men are at work on the old Colonial property, which adjoins the O'Brien Mine. Some patches of high-grade ore are being encountered, and the general outlook for the property is said to be favorable. The geological conditions on the Colonial are somwhat similar to the O'Brien, while a number of veins are in evidence in which silver occurs in encouraging quantities. The Colonial control is closely held and the property has lain in idleness for quite a number of years. Last year, a little work was done but the necessary financial arrangements had not been made to keep the enterprise going. It is regarded as being a property of more than ordinary merit.

Work is being speeded up at the Keeley Silver Mines for the purpose of getting milling operations under way some time in July. This will be the first time for a mill to operate in South Lorrain, with the exception of the plant on the old Wettlaufer Mine. This mine, now considered to have been worked out, produced something like 2,000,000 ounces of silver in a comparatively short time and paid $637,465 in dividends.

Elk Lake and Gowganda.

Work in the Gowganda district is not extensive, there being a tendency on the part of claimholders to bide their time pending the outcome of the scheme to build a light railway through the field.

Some road work between Elk Lake and Gowganda has been under way for some time, but Hon. H. Mills, Minister of Mines for Ontario, visited Elk Lake on June 18, and in an interview with the representative of the Journal made the statement that this road work would probably be stopped because the light railway is to be built to Gowganda from Swastika. This may indicate that the Ontario Government has decided to lend financial assistance to the Northern Light Railway Company, which concern recently appealed to the Government for support to the extent of purchasing $3,500 in bonds in the new company for each mile of line built. The proposed line, which is intended to serve Kirkland Lake, Fort Matachewan, Gowganda and West Shining Tree is about 100 miles in length, and assistance from the Government would approximate $350,000, while the Northern Light Railway itself is disposing of an additional bond issue of $1,500,000 for construction and equipment.

The Collins property at Leroy Lake will not be re-opened for some weeks, although it had been reported not long ago that operations would be resumed by early Summer.

Work in Gowganda consists chiefly of the operations on the Miller Lake O'Brien, Trethewey (Castle) and the Saunderson property near Wigwam Lake. A few men are working at Babs Lake, while arrangements are being made to open the Powerful property within the next six weeks.

THE GOLD MINES.

The Porcupine District.

Optimism among the gold miners in Northern Ontario was never so marked as now. This optimism has developed among mine managers who during the past few years have repeatedly cautioned against over estimates of probable achievements. Time has shown the wisdom of this cautious attitude.

Now, however, the economic conditions are improving, and the outlook justifies the optimism of conservative and well-informed mining men.

H. P. De Pencier, general manager of the Dome Mines, and referred to by the company's president J. S. Bache as formerly being almost pessimistic, made the official statement: "I have not been so well pleased as I am now since the discovery of the large ore-bodies in 1914."

A talk with A. F. Brigham of the Hollinger Consolidated is all that is required to convince anyone of the physical status of that mine being the best so

far in its history. The same is true of R. J. Ennis, general manager of the McIntyre-Porcupine.

Indeed, the producing gold mines of Northern Ontario, located at Porcupine and Kirkland Lake, without a single exception have been adding to their proven ore-reserves at a rate which presages achievements far greater than anything in the past history of gold mining in Canada. That is a statement which may be verified time after time by a visit to each of the producing gold mines.

Good headway is reported in connection with the negotiations between the Dome Lake and the West Dome Consolidated. It is intimated in usually well-informed circles that the consolidation of these two properties has every appearance of becoming a reality. It is believed a re-organization will take place in which there will be a substantial amount of stock placed in the treasury for financing work.

The announcement recently made in the Journal that the E. J. Longyear interests were contemplating a drilling campaign in that area lying west of Porcupine and which is covered by an extensive sand-plain has caused a good deal of interest in the Porcupine district. These interests are known to have discovered many millions of dollars worth of nickel by carrying on a similar exploration effort at Sudbury and have also been responsible for development of coal-mining at Longyear City in Spitzbergen.

Owing to difficulties said to have developed in connection with the failure of the Thompson-Krist interests to meet their obligations in connection with financing the Northerown Mines, the operations of that property have been temporarily suspended. In the meantime, the underground workings are being kept de-watered.

Details pertaining to the Allied Porcupine Gold Mines, Ltd., which was incorporated a few months ago for the purpose of taking over a number of properties in the eastern part of the township of Whitney in the Porcupine district, have been secured, the salient features of which are these:

The company is incorporated under the laws of Ontario, having an authorized capital of $5,000,000 made up of 5,000,000 shares of the par value of $1 each, and of which 2,500,000 shares are in the treasury.

The following properties have been acquired by the new company:—

A group of eight mining claims comprising 309 acres which formerly belonged to the Three Nations Gold Mining Company, Ltd.

Also a group of four claims comprising about 160 acres which formerly belonged to La Palme Porcupine Mines, Ltd.

Also two claims comprising 80 acres which were formerly known as the North Whitney Gold Mines as well as the Cavana Veteran claim comprising 160 acres, thereby giving the company control of a total of approximately 720 acres all situated in one block.

In addition to the exchange of shares in the Allied Porcupine for the issued stock of the former companies, the Allied Porcupine is taking over the mining plant and mill which was erected some years ago on the Three Nations property. The mill has a battery of ten stamps and is estimated to be able to treat about 40 tons of ore daily, and for this mill and the mining plant, the Allied Porcupine is paying $75,000.

The management contemplates testing the property by much underground cross-cutting, and will diamond drill the whole vein-system to a depth of a thousand feet.

"Improvements will be made in the 10-stamp mill, by the addition of concentrators and cyaniding plant, to bring the mill up to a daily capacity of 40 tons daily. The mill will be used for testing ore from development work."

The officers of the amalgamation are as follows: Col. W. A. McConnell, president; Rufus S. Hudson, vice-president and treasurer; A. J. Young, secretary; P. Kirkegaard, consulting engineer. W. D. Robb, vice-president of the Grand Trunk Railway, is a director of the new company.

Kirkland Lake Field.

Lateral work is proceeding along the new ore-body recently found at the 900 ft. level of the Kirkland Lake Gold Mines. The gold content of the ore across a width of about seven feet has so far been found to average a little over $20 to the ton.

Milling operations in the new plant on the Wright-Hargreaves mine have been exceedingly satisfactory. The mill is treating about 140 tons of ore daily and it is evident that the grade of the ore will not be far below the high average established on the Lake Shore.

Further new gold finds have been reported during the past week. One such report comes from the township of Rattray, south of Larder Lake, and a considerable amount of claim-staking is being done. A new find of tellurides of gold is reported on claims at Sesekinika which belong to the Lightning River Gold Mines.

TEMISKAMING PROSPECTORS WANT MINING ACT AMENDMENTS.

The special general meeting held in the Court House at Haileybury, June 15, under the auspices of the Temiskaming Prospectors' Association was well attended. The meeting had for its object the presentation of the views of the prospectors on questions having a vital bearing on their profession. There were several who spoke in the interests of the prospectors, at the conclusion of which Hon. H. Mills, Minister of Mines replied in a general way to the majority of the suggestions put forward. The "Journal" covered the meeting by special representative.

J. Hill, president of the Association dealt briefly with the work of the Department during the past year and expressed approval particularly of the reduction in the amount of assessment work required to be performed on mining claims, as well as giving his approval to the holding of Prospectors' classes in the mining districts.

Mayor N. J. McAuley extended a welcome to the Minister of Mines, and pointed to the large gathering of prospectors as evidence of a general desire to encourage the Minister to co-operate with the prospecting fraternity which was so essential to the mining industry and the general welfare of Northern Ontario.

The Discovery Clause.

Peter Graham, speaking as a prospector on behalf of the Association in connection with the Mining Act and the necessity of making a valuable discovery of mineral in place, stated that: "The discovery clause is regarded by most prospectors as a farce." Mr. Graham stated that there are very few mines in Northern Ontario the staking of which was based upon such a discovery. In Kirkland Lake, he said there was only one

such mine. He cited a case of where one prospector makes a promising discovery on the edge of a swamp or sand plain. There may be no way of determining whether or not the vein runs beneath the swamp or sand, although it probably does. The prospector "takes the bull by the horns, stakes out a claim and proceeds to take a false affidavit," that he has discovered valuable mineral in place. He suggested that the discovery clause should be struck out and application should be required "for mining land only."

The views of Mr. Graham were supported by remarks from Mr. Pinelle, who stated that the existence of the discovery clause and the lack of its enforcement made the law unstable.

Timber Ownership on Claims.

Mr. McLeod spoke for the Association on the question of denying the prospector the right to the timber upon mining claims. He believed the prospector, after patenting his claim, should become the owner of the timber. He emphasized the point that the prospector would thereby take an interest in protecting the country from disastrous forest fires. As matters now stand, it is not in the interests of prospectors to protect the timber.

Assessment Work.

Mr. L. Howey, spoke for the Association in connection with assessment work on mining claims. He suggested that work performed by prospectors between the date of staking out a claim and the date of recording such claim should be extended from 15 to 30 days, as this would relieve the prospector from the necessity of coming out to record a claim and then return again to do the assessment work. Nothing was said as to the present unsatisfactory and jumbled form of the Act which permits prospectors to hold a mining claim for two years by the performance of only 30 days' assessment work.

Passenger and Freight Rates.

Mr. M. B. Grover advanced an excellent plea for a greater degree of cooperation on the part of the railways toward the prospectors of Northern Ontario. He asked the Minister to use his influence to secure a more reasonable rate in connection with the shipment of small lots of dynamite and also asked for special passenger rates for the prospectors. He stated that the mining industry made the T. & N. O. Railway and that it is up to the T. & N. O. to help the prospector.

Roads and Trails.

Thos. Montgomery dealt with the question of roads and trails and stated that although he had packed over nearly every trail in the North, yet in no case had he travelled over one which had been cut by the Government. The prospectors, he said, are obliged to cut their own trails and the mining law gives no credit for it in computing the amount of assessment work required to be done. He cited the case of Lebel township where the Government is having a road stumped and urged "more speed" in connection with the work. It was pointed out that fire rangers do little or nothing in the way of opening trails.

Mr. Paul, speaking for the prospectors, asked that in cases of where more than one abstract may be required that the Recorders should provide the original for the usual fee of 25 cents each, but that duplicate copies should be provided for 10 cents each. He also urged the Ontario Government to be more aggressive in connection with advertising the mining industry in the province abroad.

Professional Engineers' Bill.

Mr. Stevenson, for the Association, made a pointed attack upon the proposed Engineers' Bill. "We, as prospectors, strongly object to this Bill which dictates who or whom we shall employ to work our property. We believe it is presumptuous on the part of the Government to legislate in such a manner as to cause us to either stop work or employ a "walking certificate"." Mr. Stevenson pointed out that the prospectors were not in any way opposed to the activities and good work of engineers, and expressed the opinion that the real engineer who has practical experience as well as technical knowledge is in very great demand and able to command his own price without the protection of a bill which would tend to protect the incompetents.

Proposed Light-Railway.

Mr. Pinelle dealt with the question of the proposed light railway which is to run east and west from Swastika. The Government, he said, has been asked to contribute $3,500 for each mile constructed, but although favorably disposed to do so, is holding the final decision in abeyance. He urged speedy action.

Replies from the Minister of Mines.

Hon. Mr. Mills replied to the suggestions pretty much in the order of their presentation. He stated that late this Fall, probably about Nov. 15, the holding of prospectors classes would be resumed, and the field would be extended.

About the "discovery clause", the Minister declared that such a clause is necessary in cases where title is given to the holder. The matter of eliminating the discovery clause had been considered at the last session, but a decision was reached to leave the matter in abeyance pending its further consideration. He stated: "I am rather sympathetically inclined to remove the discovery clause," said the Minister, and it was also intimated that the question was under consideration of finding a way to assure continual work on claims rather than let them fall into a state of idleness after patent was under consideration. "I don't believe work should stop when a man digs a hole and then sits down." He intimated some method of continuous work should be decided upon.

In regard to trails, Hon. Mr. Mills stated that in the recent reduction in the amount of assessment work on mining claims, it is made easier for the prospector to find time to cut trails to his claims. The Minister also stated that last year the sum of $10,000 had been placed in the estimates to cover this requirement, but that not a dollar had been asked for. This year, he said, the estimate was reduced to $5,000. He believed that in mentioning this, a hint would be sufficient to the wise.

About the question of timber, the Minister blamed the abuse of the privileges formerly bestowed as the reason for the present stringent regulations. He stated, however that he believes the present law is too hard on the prospector, and that claimholders should be allowed to use timber required for buildings and for mining purposes.

The Minister stated that the suggestion concerning assessment work as presented in a resolution by the Association could be adjusted satisfactorily

In the matter of passenger and freight rates, the matter is one which rests with the T. & N. O. Railway Commission and the Railway Board. Mr. Mills told the prospectors but that he would do what he could to have their case considered.

Mr. Mills stated that arrangements would be made

to provide duplicate abstracts for 10 cents each where more than one were required.

As regards advertising, the Government had spent $1,000 recently in advertising in England, and had sent some of its richest speciments to the Old Country for exhibition purposes. The Minister did not appear to be very enthusiastic about this question of advertising abroad.

In connection with the Engineers' Bill, Hon. Mr. Mills stated that it had been only referred to a special committee, and that no one need entertain any fear that it would pass in its present form.

At the conclusion of the Minister's statements, Mr. W. E. Simpson suggested that if a scheme of continual work on claims were to be considered, some scheme for the claimholders to turn this work to more profitable account should be considered and that the Government should be prepared to consider the question of erecting small custom plants where the prospector could have ore treated and in that way produce at least a moderate amount of new wealth for the country as well as having a means of getting something in return for his energies rather than the mere routine of performing assessment work. In this way he believed the Government could help the prospectors to become owners of mines rather than devoting their time in searching for a possible buyer at the purchasers' own terms.

British Columbia Letter

Alice Arm B.C.: The Dolly Varden Mine still is idle although Major North, the manager for the Taylor Mining Co., is busy on a general survey of the property, as well as of the Wolf Claims, with a view to the opening of development work at an early date—The McPhee, "Mother-in-Law," "Black Diamond," Toric, and the Independent properties are receiving attention, in most cases the owners taking advantage of the season's opening to start assessment work. On the Independent a tunnel is being driven.

Trail B.C.: Ore receipts at the Consolidated Mining Smelting Co's plant, Trail B.C., for the week ending 29th May totalled 7918 tons. For the following week, the first in June, there were received 7,137 tons. The aggregate now is over 180,000 tons for the year and it would seem that the 200,000 tons mark will be exceeded by the end of the half years. In addition to company properties the Paradise Mine, Windermere District, and the Knob Hill, a Washington State Mine, appeared on the list of shippers for the first week of this month.

Nelson B.C.: Ore taken from the Gold Reef Mining Company's property, Lemon Creek, is being subjected to a mill test in Vancouver which, if necessary, will to a mill test in Vancouver which, if satisfactory, will ore is practically all free milling. Harold Lakes, superintendent of the Nugget Gold Mines Ltd., Sheep Creek, states that 100 tons a day now is being put through the mill with 97 per cent recoveries. Lack of experienced miners, he says, makes it impossible for the stoping to keep pace with the mill requirements, so that it is necessary to draw to some extent on the 4,000-ton reserve. There are 35 men employed underground and at least 15 more exeprienced miners are needed. No trouble is met with in finding muckers but the classof skilled labor desired is not easy to find. The mill has been tuned up since it began running on April 29 and is giving every satisfaction. More bunkhouse accommodation has been provided and working conditions in the mine have been improved. Stoping is being done on the main vein which was struck at a depth of 650 feet last year by a long cross cut from the Motherlode. For a length of about 180 feet, with both ends of the stope in ore, the ore-shoot has been stoped out for a height of some 200 feet according to Mr. Lakes. Fourteen drills are being operated in this section of the mine and four in the Motherlode.

Duncan, B.C.: The manganese deposits of Hill 60, Cowichan District, Vancouver Island, were inspected recently by George C. Mackenzie, formerly of the Canadian Geological Survey and now general secretary of the Canadian Institute of Mining & Metallurgy. It is likely that, as a result, the property will the thoroughly prospected by means of diamond drill. George C. Aylard, of the Standard Silver-Lead Mining Company, who now is in control of the manganese property, is expected to provide the financial backing necessary to make the proposed exploration as complete as possible.

Merritt B.C.: What is said to be a new mineral has been found in the district adjacent to Merritt by William McNeill and, as a compliment to Mr. Charles Camsell, deputy Minister of Mines for the Dominion, and who has done much for the western country in geological research, has been named Camsellite. The Canadian Mineralogical Department writes Mr. McNeill that a paper describing the occurrence of a boron mineral from a serpentine mass near Douglas Lake has been presented to Section IV of the Royal Society of Canada. The new mineral is said to take the form of fine fibres being distingnishable with diffienlty from the chrysotile with which it often is very intimately mixed. In addition to the camsellite and the chrysotile in the specimen examined there is more or less dolomite. The three minerals do not occur in the same proportion throughout the material; in fact there are wide variations in this respect. It was not found practicable to separate the camsellite in an ideally pure state, but three analysis were obtained—one of the camsellite mixed with small quantities of chrysolite and dolomite, one of the pure chrysolite and one of the pure dolomite—from which the normal composition of tthe new mineral was calculated as follows:

Magnesia	47.87
Boron trioxide	41.44
Water	10.69
	100.00

It is further stated that the possibility of a commercial use being found for this mineral would be kept in mind and the discoverer informed of any developments.

Cranbrook B.C.: Sluicing has been commenced by the Gamble Mining Co. on Wild Horse Creek, Cranbrook District. The first clean-up of the season is reported to have been satisfactory. From one sluice box only, gold values aggregating $800 were taken and the management is optimistic over the prospects. Water has been diverted from Boulder and Fisher Fisher Creeks and the force is strong enough to move most of the boulders encountered although in a few instances it is necessary to use powder.

Vancouver B.C.: Reports of the annual meeting of the Granby Consolidated Mining, Smelting & Power Co. indicate that all the old directors were re-elected with the exception of the replacement of S. H. Steel, deceased, by J. T. Cabbe. The annual report is expected to be issued in about ten days. Meanwhile it is stated that the 1920 operations will show a deficit. At present it costs the company slightly over 12 cents a pound to produce copper. During the past few months economies had been effected reducing costs to 14 cents Canadian or 12.4 American currency, said to be four cents a pound better than during the six-month period prior to the changes. Reserves of high-grade copper were reduced 200,000 tons, being reported December 31 as 10,986, 420 tons. Copper production in 1920 amounted to 27,000,000 pounds of blister copper of which 25,000,000 had been refined. Unsold copper at the end of the year came to approximately 20,000,000 pounds of which 3,000,000 pounds represented metal in process. Sales of copper for the year totalled 19,464,000 pounds. Decrease in the ore reserves was due to the confining of running operations entirely to ore production during the present period of relatively high costs. As soon as the 150-foot level at the Hidden Creek Mines had been opened sufficiently, permitting development without interference with ore production, prospecting to extend the ore boundaries will be resumed. Labor conditions are described as good.

Victoria B.C.: The Standard Silver-Lead Mining Co. is reported to have sold its mines at Silverton for $75,000, subject to the ratification of the deal by the shareholders. A meeting for this purpose is to be held on June 20 and as shares are controlled by the directors there is no doubt of the result if there is no change of the situation in the interval. The Standard has yielded to its shareholders some $2,700,000 in dividends, having been one of the big producers of the Slocan District.

Edmonton, Alberta: Gold is reported to have been discovered on Cadotte river, about 70 miles northeast of Peace River town. News of a rich find spread through the district on wings and when the original locator woke one morning he found many gold seekers on the ground. There is doubt as to the importance of the camp but those first on the scene are satisfied. One of the latter explains that "I secured several pans of gravel and in each one I washed a tail flower of gold about three inches long and about the width of my little finger and, I should judge, containing about 300 colors."

From the Pas, Manitoba, comes a report that a rich gold strike has been made at Elbow Lake in the Athapapuskow mining area and east of the Gordon dyke discovered last summer. Some of those who have returned give details of a vein sixty feet wide containing free gold plainly visible to the naked eye.

Two prospectors, Dick Inkster and T. E. Hankin, have returned from the Liard River District, northern British Columbia, where they were engaged in a search for oil. They have brought back samples, which are attracting much interest. Mr. Hankin tells of his, and his companion's experiences, entertainingly. He says:

"The place where we got our samples is at the foot of a river. There is a ridge of sandstone along the river which the Indians told us had been burning for years. There is plenty of evidence that this ridge of rock had been subjected to great heat, as it is baked red, but the fire has died out. A heavy slide of clay and gravel occurred behind this burning rock, which apparently interfered with the fuel supply that kept the fire going in the rocks and it went out. It is now burning behind this ridge in the clay and gravel, but in a much less degree. There is also a very strong smell of gas at this place, and when the air is still, the whole atmosphere is impregnated with it for some distance around, in fact it made us sick when we stayed in it too long. We took samples from different spots for a distance of about half a mile. No doubt if we were there in the Summer time we would have had a better opportunity to get samples. As it was, we had to get them where the snow was off."

"On our return trip we came across a white man who lives in that far-northern wilderness with his young daughter. They were on their way up to the Hudson's Bay post for supplies and expected to return by canoe when the river opened. The man informed us that if he had known that any one was in the country he would have brought samples of oil from his place, 30 miles farther down the river. He said that oil could be seen floating on the surface of the water during the Summer, and that gas bubbles were continually forming on the water. There are also hot springs there, and he grows potatoes and other vegetables with great success."

"We also came across some Indians, or rather they came across us. They saw our tracks and followed us, telling us later that they knew our tracks were not made by Indians. They stayed with us, and more turned up later, till we had a regular caravan of dog teams with many bells and gaily-decorated harness, and sleighs in all colors of the rainbow. They carried very little camp equipment and very scanty rations of dried moose-meat. They put up with all the discomforts attendant upon such a life with a cheerfulness that was surprising. We found them very friendly and anxious to assist us in any way they could. We had to hold school every night, as they were very anxious to learn how to read and write."

One day the Indians happened to overhear me singing. (I was singing a little song that I had learned in the trenches in France). One of them asked me what kind of song it was. I told him it was a soldier's song. After that, nothing would do, but I must sing 'soldier's sing.' I put them off till we got back to Liard post, when the whole tribe descended on us and begged me to sing 'soldier song.' My fame had evidently spread among them, so there was nothing to do but start in, which I did, after apologizing for the racket I was about to start. The natives evidently seemed delighted with my performance, as I was applauded and encored at every turn. No grand-opera star ever had such an appreciative audience as I had in that tightly-packed log-hut in the lonely northern wilds. I sang them anything that happened to come into my mind, from 'My Home in Tennessee' to 'Rule Britannia'."

"The tea drinking tendencies of the Indians are enormous, drinking it as they do, at any time they can get it. They made sad inroads into our sugar-sack and tea supply. However we were able to get more at the post, where there is a large stock of everything necessary for the grub-box on such a trip. The prices are necessarily high at such a place, and, plus the high cost of living, comes rather high. Sugar is 50 cents per pound, flour three pounds for a dollar."

"We met with courtesy and kindness from all those with whom we came in contact on our journey. We averaged about 30 miles a day with our dog-team. It was one of the best dog-teams I have ever owned, and I have had many."

"The country is comparatively flat after passing down the Dease River, and mountains can only be seen in the far distance. Game is plentiful and we had no trouble in keeping ourselves supplied with moose meat, but there is such a thing as knowing how, and it takes a lifetime to learn about the wilds and how to get the best of it."

"I must mention that in getting our samples, we could not help getting clay and other foreign matter mixed with it. When I washed the shovel that I had been digging with, the surface of the water became immediately covered with an oily substance resembling the colors of the rainbow. In places the gravel appears to be soaked with oil, but not enough to get it up without taking up the dirt as well."

"The colors and consisteney of the oil varies at different spots, some being thin and light-colored, and in other places dark and heavy, that is very thick from a greenish-black to a dark-brown. It seeps out along the foot of the bank at short distances apart as far as we could see where the snow is off. The rock formation is of a shaley character, from a gray to a blue-gray color."

"We did not prospect for gold, and there were many places I should have liked to try, but our time and supplies were limited, and it was hardly the season for that kind of work, as everything was still frozen up, but with proper exploration there is no doubt that this great Northland will yet reveal wealth that will be a surprise to the world. It is not too difficult of access, there being a down-stream water-way from Dease Lake into the very heart of the Liard country with a few short portages. Dease Lake is reached from Telegraph Creek by a first-class four-foot trail, and Telegraph Creek is reached by river gas-boat from Wrangell, Alaska. The distance from Telegraph Creek to Dease Lake is 72 miles."

Coal production in British Columbia for the month of May shows a decline in comparison with that of April of 17,599 tons, the totals being: April, 209,152; May, 191,553. Whether the cause of this evident slackening of trade is the easing of the situation as to fuel-oil supplies and the consequent reversion of users to the foreign liquid-fuel or whether it is to be found in the natural falling off in demand with the advent of the Summer are questions difficult to answer. Likely the true explanation lies in about equal proportions between the two circumstances. Fuel oil certainly is more plentiful and cheaper and more of it is being consumed. That every gallon imported displaces home-produced coal is an incontrovertible fact.

On Vancouver Island the two large collieries, Canadian Western Fuel Co. and Canadian Collilieries (D) Ltd., produced in May a total of 103,548 tons. It is significant that the Western Fuel Co.'s output for May, 37,398 tons, was 2,385 tons less than that for April. As this Company's trade is in the domestic market to a very large extent it is clear that this business is not as brisk. On the other hand the Canadian Collieries made a small increase of 556 tons in May over April. As 90 per cent of its trade is found in supplying mercantile traffic and in other sources outside the purely British Columbia requirements it would appear that the outside requirements have not declined in any marked degree.

The Granby Collieries, Cassidy, Vancouver Island, which were placed under new management on the 1st of June, fell off in production in May some 2,223 tons in comparison with the April total.

In the Nicola-Princeton Field, the Middlesboro and Fleming Collieries show an improvement of 421 and 565 tons respectively, while the Coalmont Collieries, where new plant is being installed and over work of a development character is under way, produced about 4,783 tons less than during the previous month.

The Crow's Nest Pass Coal Company at Coal Creek produced 5,289 tons less in May than in April; at Michel the decline amounted to 3,744 tons, while the Corbin Coal & Coke Company's output fell 782 tons. The explanation, no doubt, lies in the fact that unusually mild weather has been experienced on the prairies. It is likely that these collieries will be put under a serious handicap during the next few months if the recent 10 per cent reduction in freight rates, extended by the Railway Board to the prairie provinces, is not extended to include them.

Following are the details of the coal production in British Columbia for the month of May:

Output of Coal for May, 1921.

Mine	Tons	
Vancouver Island District.		
Canadian Western Fuel Co., Nanaimo	37,398	
Canadian Collieries (D) Ltd.,		
Comox	41,210	
South Wellington	7,812	
Extension	17,138	
Nanoose Wellington Collieries	2,852	
Granby Consolidated MS & P Co.,		
Cassidy	24,361	
Old Wellington, (King & Foster)	435	
Total	131,196	131,196
Nicola-Princeton District.		
Middlesboro Collieries, Middlesboro	5,554	
Fleming Coal Co., Merritt	3,072	
Coalmont Collieries, Coalmont	1,485	
Total	10,111	10,111
Crow's Nest Pass District.		
Crow's Nest Pass Co.,		
Coal Creek	27,690	
Michel	17,074	
Corbin Coal & Coke Co., Corbin	5,482	
Total	50,246	50,246
		191,553

TORONTO COAL PRICES.

Toronto, June 22.—The prices of anthracite coal remain absolutely unchanged since last week. In the slack market the prices range from $1.00 to $1.75, depending on grade. Mine run is $1.75 to $2.70 and lump coal $2.35 to $3.25. The difference in price, between the range named, depends on quality. Business is about the same—at least, there is no sign of improvement. Bituminous production has decreased, approximately, 1,000,000 tons in a week. This decrease faithfully reflects business conditions. Of course, so far as the coal dealers are concerned, less production now will mean larger profits for them later on.

The Canadian Miners' Buying Directory.

Acetylene Gas:
Canada Carbide Company, Ltd
Prest-O-Lite Co. of Canada, Ltd.

Acetylene Welding:
The Toronto Iron Works, Ltd.

A.C. Units:
MacGovern & Co
Powley & Townsley, Limited.

Agitators:
The Dorr Co.

Air Compressors:
Belliss & Morcom, Ltd.
Laurie & Lamb

Air Hoists:
Canadian Ingersoll Rand Co., Ltd
Mussens, Limited.

Air Receivers:
The Toronto Iron Works, Ltd.

Alloy and Carbon Tool Steel:
International High Speed Steel Co., Rockaway, .
Peacock Brothers Limited.

Alternators:
MacGovern & Co.

Aluminium:
Spielman Agencies, Regd.

Amalgamators:
Northern Canada Supply Co.
Mine and Smelter Supply Co.
Wabi Iron Works.

Antimony:
Canada Metal Co.

Antimonial Lead:
Pennsylvania Smelting Co.

Arrester, Locomotive Spark:
Hendrick Manufacturing Co.

Assayers' and Chemists' Supplies:
Dominion Engineering & Inspection Co
Lymans, Limited
Mine & Smelter Supply Co.
Pennsylvania Smelting Co.
Stanley, W. F. & Co., Ltd.

Ash Conveyors:
Canadian Link-Belt Company

Ashes Handling Machinery:
Canadian Mead-Morrison Co., Limited
Canadian Link-Belt Co., Ltd.

Assayers and Chemists:
Milton L. Hersey Co., Ltd.
Campbell & Deyell
Ledoux & Co.
Thos. Heys & Son
C. L Constant Co.

Asbestos:
Everitt & Co

Balls:
Canadian Foundries and Forgings, Ltd
Hull Iron & Steel Foundries, Ltd.
Peacock Brothers Limited.
The Wabi Iron Works.
The Hardinge Conical Mill Co
The William Kennedy & Sons, Ltd.

Ball Mills:
Hardinge Conical Mill Co.
Hull Iron & Steel Foundries, Ltd
Mine and Smelter Supply Co.
The Wabi Iron Works.
The William Kennedy & Sons, Ltd.

Balances—Heusser:
Mine and Smelter Supply Co

Babbit Metals:
Canada Metal Co.
Hoyt Metal Co.

Ball Mill Feeders:
Hardinge Conical Mill Co.
Hull Iron & Steel Foundries, Ltd

Ball Mill Linings:
Hardinge Conical Mill Co
The William Kennedy & Sons, Ltd.
Peacock Brothers, Limited
Hull Iron & Steel Foundries, Ltd.

Belting—Leather, Rubber and Cotton:
Canadian Link-Belt Co., Ltd.
The Mine & Smelter Supply Co.
Northern Canada Supply Co.
Jones & Glasco.

Belting:
R. T. Gilman & Co
Gutta Percha & Rubber, Ltd

Belting—Silent Chain:
Canadian Link-Belt Co., Ltd.
Hans Renold of Canada, Limited, Montreal
Jones & Glassco (Regd.)

Belting (Transmission):
Goodyear Tire & Rubber Co

Belting (Elevator):
Goodyear Tire & Rubber Co

Belting (Conveyor):
Goodyear Tire & Rubber Co
Gutta Percha & Rubber, Ltd.

Bins and Hoppers:
The Toronto Iron Works, Ltd.

Blasting Batteries and Supplies:
Canadian Ingersoll-Rand Co., Ltd
Mussens, Ltd.
Northern Canada Supply Co.
Canadian Explosives, Ltd.
Giant Powder Co. of Canada, Ltd.
Powley & Townsley, Limited.

Bluestone:
The Consolidated Mining & Smelting Co
The Coniagas Reduction Co., Ltd.

Blowers:
Canadian Fairbanks-Morse Co., Ltd
MacGovern & Co., Inc.
Northern Canada Supply Co.
Fraser & Chalmers of Canada, Ltd

Boilers:
Northern Canada Supply Co.
Canadian Ingersoll-Rand Co., Ltd
Marsh Engineering Works
MacGovern & Co., Inc.
R. T. Gilman & Co.
Fraser & Chalmers of Canada, Ltd
The John Inglis Company
Wabi Iron Works.

Blue Vitriol (Coniagas Red):
Canadian Fairbanks-Morse Co., Ltd

Bortz and Carbons:
Diamond Drill Carbon Co.

Boxes, Cable Junction:
Standard Underground Cable Co. of Canada, Ltd
Northern Electric Co., Ltd.

Brazilian Rough Diamonds:
Diamond Drill Carbon Co.

Brazilian Mica:
Diamond Drill Carbon Co.

Buggies, Mine Car (Steel)
Hendrick Manufacturing Co

Brazilian Ballas:
Diamond Drill Carbon Co.

Brazilian Rock Crystal:
Diamond Drill Carbon Co.

Brazilian Tourmalines:
Diamond Drill Carbon Co.

Brazilian Aquamarines:
Diamond Drill Carbon Co.

Bridges—Man Trolley and Rope Operated—Material Handling:
Canadian Mead-Morrison Co., Limited

Bronze, Manganese, Perforated and Plain:
Hendrick Manufacturing Co.

Buckets:
Canadian Ingersoll-Rand Co., Ltd.
Canadian Mead-Morrison Co., Limited
The Electric Steel & Metals Co.
R. T. Gilman & Co.
Hendrick Manufacturing Co.
Canadian Link-Belt Co., Ltd.
Marsh Engineering Works
Mussens, Ltd.
MacKinnon Steel Co., Ltd.
Northern Canada Supply Co.
Fraser & Chalmers of Canada, Ltd
The Wabi Iron Works

Buckets, Elevator:
Canadian Link-Belt Co., Ltd.
Hendrick Mfg. Co.
Peacock Brothers Limited.

Cable—Aerial and Underground:
Canada Wire & Cable Co.
Northern Canada Supply Co.
Standard Underground Cable Co. of Canada, Ltd
Peacock Brothers, Limited

Cableways:
Canadian Mead-Morrison Co., Limited
Fraser & Chalmers of Canada, Ltd.
Mussens, Ltd.
The Wabi Iron Works
R. T. Gilman & Co.

Cages:
Canadian Ingersoll-Rand Co., Ltd., Montreal, Que
Northern Canada Supply Co.
Fraser & Chalmers of Canada, Ltd.
The Electric Steel & Metals Co.
The Mine & Smelter Supply Co.
Mussens, Ltd.
The Wabi Iron Works

BRITISH COLUMBIA

The Mineral Province of Western Canada

Has produced Minerals valued as follows: Placer Gold, $75,944,203; Lode Gold, $102,753,823; Silver, $53,668,284; Lead, $46,637,221; Copper, $161,513,864; Zinc, $19,896,466; Coal and Coke, $212,573,492; Building Stone, Brick, Cement, etc., $32,168,217; Miscellaneous Minerals, $1,037,408; , making its mineral production to the end of 1919 show an

Aggregate Value of $706,192,978

The substantial progress of the Mining Industry of this Province is strikingly exhibited in the following figures, which show the value of production for successive five-year periods : For all years to 1895, inclusive, $94,547,241; for five years, 1896-1900, $57,605,967; for five years, 1901-1905, $96,509,968; for five years, 1906-1910, $125,534,474; for five years, 1911-1915, $142,072,603; for the year 1916, $42,290,462; for the year 1917, $37,010,392; for the year 1918, $41,782,474; for the year 1919, $33,296,313; 1920, $35,543,084.

Production During last ten years, $331,995,328

Lode-mining has only been in progress for about twenty-five years, and not 20 per cent. of the Province has been even prospected ; 300,000 square miles of unexplored mineral bearing land are open for prospecting.

The Mining Laws of this Province are more liberal and the fees lower than those of any other Province in the Dominion, or any Colony in the British Empire.

Mineral locations are granted to discoverers for nominal fees.

Absolute Titles are obtained by developing such properties, the security of which is guaranteed by Crown Grants.

Full information, together with Mining Reports and Maps, may be obtained gratis by addressing

THE HON. THE MINISTER OF MINES
VICTORIA. British Columbia

PROVINCE OF QUEBEC

MINES BRANCH

Department of Colonization, Mines and Fisheries

The chief minerals of the Province of Quebec are Asbestos, Chromite, Copper, Iron, Gold, Molybdenite, Phosphate, Mica, Graphite, Ornamental and Building Stone, Clays, etc.

The Mining Law gives absolute security of Title and is very favourable to the Prospector.

MINERS' CERTIFICATES. First of all, obtain a miner's certificate, from the Department in Quebec or from the nearest agent. The price of this certificate is $10.00, and it is valid until the first of January following. This certificate gives the right to prospect on public lands and on private lands, on which the mineral rights belong to the Crown.

The holder of the certificate may stake mining claims to the extent of 200 acres.

WORKING CONDITIONS. During the first six months following the staking of the claim, work on it must be performed to the extent of at least twenty-five days of eight hours.

SIX MONTHS AFTER STAKING. At the expiration of six months from the date of the staking, the prospector, to retain his rights, must take out a mining license.

MINING LICENSE. The mining license may cover 40 to 200 acres in unsurveyed territory. The price of this license is Fifty Cents an acre per year, and a fee of $10.00 on issue. It is valid for one year and is renewable on the same terms on producing an affidavit that during the year work has been performed to the extent of at least twenty-five days labour on each forty acres.

MINING CONCESSION. Notwithstanding the above, a mining concession may be acquired at any time at the rate of $5 an acre for SUPERIOR METALS, and $3 an acre for INFERIOR MINERALS

The attention of prospectors is specially called to the territory in the North-Western part of the Province of Quebec, north of the height of land, where important mineralized beltsare known to exist.

PROVINCIAL LABORATORY. Special arrangements have been made with POLYTECHNIC SCHOOL of LAVAL UNIVERSITY, 228 ST. DENIS STREET, MONTREAL, for the determination, assays and analysis of minerals at very reduced rates for the benefit of miners and prospectors in the Province of Quebec. The well equipped laboratories of this institution and its trained chemists ensure results of undoubted integrity and reliability.

The Bureau of Mines at Quebec will give all the information desired in connection with the mines and mineral resources of the Province, on application addressed to

HONOURABLE J. E. PERRAULT,
MINISTER OF COLONIZATION, MINES AND FISHERIES, QUEBEC.

EDITORIAL

AN OIL PROSPECTUS FROM THE PAS, MAN.

The Manitoba "Free Press' publishes the prospectus of the Pas Oil Development & Exploration Co., Ltd. The Company is incorporated under the Manitoba Companies Act, and the directorate contains the names of leading citizens of the Pas. The Company is incorporated for the purpose of testing a property for the presence of oil. The land to be prospected is near the village of Turnbury, Man., about thirty-three miles south from The Pas, near the Manitoba-Saskatchewan boundary, in the Pasquia Hills district. The property is presumably worth testing, but specific reference to this district in regard to oil possibilities in the Geological Survey reports is confined to mention of the oil-shales in Mr. McInnes's report on the basins of the Nelson and Churchill rivers. (See C.G.S. Memoir No. 30). Under the conditions the presence of fluid oil would seem to be a possibility only. The enterprise of the citizens of The Pas is to be commended, but the advertising literature of the Company contains inaccurate statements, and has some of the ear-marks of the worst kind of oil "puff." For example, under date of 18th June, the advertisement states the price of mid-Continent crude oil as being $3.50 per barrel, with additional 50 cents as a premium, and "is going much higher." The price, as given in the Boston News Bureau of the 22nd June, is actually $1.00 per barrel, and is expected to go lower. The quality of the appeal of the advertisement may be gauged by the statement that Victory Bonds "are taken at face value," and there is the usual list of oil projects showing how one hundred dollars made many thousands. Given certain suppositious happenings, it is also stated: "One share of this stock, then, would be worth $600 per share on a ten percent basis." Under the heading of "Facts" we are told "It is an established fact that more so-called investors, men and women who were able to invest only in amounts of from fifty to one thousand dollars made fortunes in oil during the past year than were ever before recorded." Names of the fortune-makers, their residences, investment and extent of the "fortune" made would be more convincing.

It is not good to see the names of members of parliament, physicians and Board of Trade members, heading a prospectus that contains such nauseating stuff, and it is far from encouraging that the initial prospecting in this newly-opened territory should have to be financed by money obtained through the creation of hopes of a nature unlikely to be fulfilled. Even if oil were to be obtained in very profitable quantities, the ultimate success of an enterprise will not justify reputable men in descending to the level of the thoroughly unscrupulous promoter by copying his style of "approach."

NATURAL GAS SUPPLY IN KENT FIELD, ONT.

The report of Samuel S. Wyer to the Minister of Mines of Ontario on the natural gas situation in the Kent Field of Western Ontario is a candid hard-hitting document, and is so simply written and so free from technicalities as evidently to have been prepared by a man who knows his subject. The supply of natural gas is declining at a rate which promises to reduce the rock pressure from its present figure of about 250 pounds to less than 50 pounds in fifteen years time. The pressure was 570 pounds in 1910. Under such conditions, the "criminal waste" in distribution of gas which Mr. Wyer reports as the result of percentage contracts and a leaky system, warrant him in stating that those who "recklessly, defiantly, persistently and continuously waste natural gas, and boldly declare their purpose to continue to do so, ought not to complain of being branded as enemies of mankind." There is apparently no system of metering the natural gas. Percentage contracts "actually stimulate a wanton waste of a limited natural resource." Distribution pressures are too high, a very aggravated condition with a leaky pipe and valve system, and the average domestic consumer is stated to "waste much more gas than he consumes."

Evidently it was high time some one examined into this natural-gas situation and told the truth, and the duty of the Ontario Government has been very plainly put before them. Every citizen of Ontario who desires to see a failing natural resource, of very great value, conserved as it is possible to conserve it, and made to last for a generation longer than it will otherwise last, should stand behind whatever legislation the Govern-

ment of Ontario enforces with this end in view. Mr. Wyer very properly remarks that contracts which encourage waste of natural gas are against public policy and should be abrogated, and that the community interest is paramount. Conservation of natural gas in Ontario, and its preservation for the use of domestic consumers, is only possible by raising the price to consumers. There is no choice in the matter. It is a case of continuing to use gas wastefully by perpetuation of existing contracts, and exhausting the supply in five years; or of paying the price for conservation methods that will prolong the gas supply maybe for twenty-five years.

THE ELBOW LAKE GOLD DISCOVERY.

In view of the very wide publicity given to the spectacular gold discovery at Elbow Lake, Manitoba, the Editor is obliged to Mr. J. P. Gordon of the Pas for the note of observations made on the ground which is elsewhere included in this issue. Mr. Gordon was himself the fortunate discoverer of a very rich local concentration of virgin gold at Copper Lake Manitoba,* and his knowledge of the mineral belt of Northern Manitoba is unexcelled. It is a country of alluring possibilities, and one that has already been proven to contain large mineral deposits of substantial value. When this season's prospecting closes the Commissioner should be able to publish another chapter in the series of mineral revelations that Northern Manitoba has so far yielded in a brief span of years.

*Note.—"The Gold Discovery at Copper Lake." R. C. Wallace, see page 731, C. M. Journal, 1st Oct., 1919.

THE SPECTACULAR GOLD FIND AT ELBOW LAKE, MAN

By J. P. GORDON, The Pas, Man.

Considering the publicity given to the spectacular gold find at Elbow lake, by the daily papers the following observations made on the ground may be of interest..

Location.

The Murray gold discovery is located at the outlet of Elbow lake about one mile south of the extreme end of the peninsula that separates the inlet from the outlet of the lake.

Spectacular Showing.

About 200 feet north of the No. 2 post and covered by 2 feet of water a spectacular showing of gold can be seen. Here the porphry sheets are separated or parted about one inch in width and this space is filled with virgin gold for that width and a length of one foot.

Other Showings.

Three hundred feet north-east of the spectacular showing of gold the prospectors have cross-channelled the dykes and at different points from the Elbow lake or north-west side of the dyke some free gold can be seen in quartz stringers over a width of 60 feet. These stringers are about 10 feet apart and vary in width up to an extreme width of 4 inches.

Formation.

The gold occurs in quartz stringers in a quartz-porphry dyke which is genetically connected with the granite. On the south-east side the porphry is in contact with the granite, that is on the discovery claim. The prospectors were of the opinion that a basic rock of the district was of a more recent occurrence than the porphry and referred to it as having "pressed over the dyke" in places. This impression is readily proven erroneous by examination of the formation on a small island to the north-east of the Murray claims, where the porphry dyke intrudes the basic rock for the entire length of the island.

Probabilities of the Prospect Developing into a Mine.

In my opinion the problem to be solved is: Are there a sufficient number of these enriched quartz stringers throughout the massive porphry or any part of it that will give a working width of commercial ore and I think this can be best determined by fairly deep trenching across the lode. The porphry is well mineralized in places with iron pyrites and may carry low gold-values that would help up the average per ton assay. Unless the porphry does carry values the usual sampling would not give satisfactory results not be a fair test to the prospect.

Island Lake Float.

It has been claimed that the spectacular float found by Ottawa and Woosey on Island lake was float from Murray find, but anyone that has seen the Island lake float and has examined the Murray claim can readily disclaim this supposition, as the float ore showed spectacular gold in a dull-grey quartz and chlorite schist, while the gold in the latter occurs in a more crystalline glassy quartz. The lode or vein from which the Island lake float was detached by some force of nature is yet a hidden treasure to be discovered by the prospector.

THE KENT NATURAL-GAS FIELD OF ONTARIO.

A report made to the Minister of Mines of Ontario, under date of 31st May, 1921, by Samuel S. Wyer of Columbus, Ohio, upon the natural-gas situation in the Kent Field of Western Ontario, submits the following recommendations:

1—Since 1910, average rock pressure has declined from 570 to 256 pounds.

2—There is no justification whatever for making open flow volume test of wells, because of needless gas waste.

3—The transmission and distribution leakage is excessive and should be curtailed.

4—The percentage contracts for sale of gas are against public policy, and should be abrogated at once.

5—Meters should be installed to measure gas into and out of all transmission lines.

6—Domestic consumers waste enormous quantities of gas through improper appliances.

7—All gas using appliances should be inspected at once by gas companies.

8—The use of wasteful appliances should be prohibited.

9—All extensions to merely maintain service should be paid for out of operating expense and not capitalized.

10—A just retail price can be fixed only by paying an adequate return on the present fair value of natural gas properties.

11—The immediate carrying out of these recommendations is imperative in order to cope with the cold weather conditions of next winter.

Memorandum on Howry Creek Gold Arsenic Area

A Report To The Ontario Department Of Mines.

By JOS. BARTLETT, Mining Inspector, Sudbury, Ont.

There are three groups of claims in the Howry Creek area on which work was in progress on April 21, 1921, when inspection was made; these are the Bousquet, the Howry Creek, and the Craig-Pollard claims. The Bousquet and Howry Creek are six and a half or seven miles east of Willisville station (revised railway mileage 65.6 miles from Sudbury) on the Algoma Eastern railway. In summer the trip to these two properties is made by a good water route, consisting of Charlton lake and Howry creek; in the winter the ice is used to the east end of Charlton lake, from which point a road has been built to the working properties. The Craig-Pollard claims are near West River station, which is at railway mileage 63.4, and are some eight and a half miles west of the claims mentioned on Howry creek proper.

The predominant rock in the area is a quartzite or arkose series; with this quartzite is associated some greywacke and conglomerate. There is also a diorite, which was seen on both the Bousquet and Howry Creek properties and along the railway between Willisville and west River.

Bousquet Gold Mines, Limited.

This company has an authorized capitalization of $2,000,000, and the shares are of $1.00 par value. Its head office is at 6 King Street West, Toronto, and the officers are: president Harold Tough, Willisville, Ontario; vice-president, Robert R. Tough, Willisville, Ontario; secretary-treasurer, Wm. B. McPherson, Toronto; directors: Thomas Baird Tough, Niagara Falls, Ontario; James A. Bousquet, Willisville, Ontario.

The holdings of this company consist of ten mining claims S. 2272, S. 2277, S. 2481, S. 3180, S. 3181, S. 3182, S. 4382, S. 4599, S. 4600, and S. 4601, in Timber Berth No. 11, in the Sudbury Mining Division.

Gold occurs on claims S. 3180 and S. 3181 in a belt of gray schist, striking approximately east and west and containing some pebbles. The rock looks like a schistose greywacke. Mr. C. W. Knight, on examining a specimen of the schist under the microscope, found it exceedingly fine-grained and composed of micaceous minerals and quartz grains; in this fine-grained matrix are quartz grains of larger size. The width of this band of schist was not ascertained, but at one point it is exposed for a horizontal width of 24 feet with no contacts visible. A slope sunk in this schist is said to be 44 feet deep, but, as it was nearly full of water, only the upper portion could be examined; this showed the schist to contain very narrow veins of quartz and ankerite and to have a dip at the surface of 55 degrees to the north. A 2-compartment vertical shaft, measuring 6 feet by 10 feet outside, is now being sunk, and on the day inspection was made had reached a depth of 20 feet.

Clean and comfortable buildings, consisting of a sleeping camp, a cook house and an office, have been completed on the claims; these are of lumber covered with "paroid." Near the shaft and incline, which are not far apart, is a combined power-house and blacksmith shop; this building contains a locomotive-type boiler, an Ingersoll-Sergeant-Cooper compressor, and an 8 by 10-inch James Cooper hoisting engine.

The Howry Creek Mining Corporation, Limited.

This company owns four claims south of the Bousquet Gold Mines' property namely S. 2279, S. 2782, S. 2783, and S. 3673.

The main vein is about half a mile south of that on the Bousquet; but is of a different type. It occupies an irregular fracture, having a general direction of east and west, and consists of altered quartzite, quartz, ankerite, arsenopyrite, pyrite, and a little chalcopyrite. At one point the combined width of the vein matter and schistose quartzite is nearly six feet, but this was the widest place seen. On the whole the vein is narrow.

The vein occurs in quartzite, or arkose, North of the vein and at one point within a hundred feet of it diorite occurs; the contact between the quartzite and diorite is covered by drift, but judging from the topography, it is probably roughly parallel to the vein. This diorite extends through to the Bousquet claims. Mr. Knight made a microscopic examination of a specimen of this rock from the Howry Creek property, and says regarding it: "It is a diorite consisting largely of plagioclase and hornblende: the plagioclase is much altered to secondary minerals. There are a few micrographic intergrowths of quartz and feldspar."

It is interesting to note that the Long lake gold mine, now abandoned, lies 25 miles to the northeast of the Bousquet and Howry Creek groups, that the ore body was an arkose carrying gold and arsenopyrite and that it was associated with diorite.

The Howry Creek Mining Corporation have sunk several test pits on the vein, the deepest of which is said to be 18 feet. An adit is now being driven N. 20 degrees W. magnetic from the south slope of the ridge on the top of which this vein outcrops. It was 90 feet long on April 21, and a few feet south of the face a vein 18 inches wide had been cut.

Near the portal of the adit a boiler house has been built which also serves as a blacksmith shop. In this building are an Ingersoll Rock Drill Company compressor, 12 inches by 16 inches, and a Nagle 50-h.p. locomotive-type boiler.

Seventeen men are being employed by this company. They are being temporarily housed on the shore of Howry Creek in some log camps that were built by a lumber company.

The capitalization of the company is $1,000,000 and the head office is at 77 Victoria Street, Toronto. The officers are: president and treasurer, Glenn C. Bull, Chicago; vice-president and manager, A. L. Kemp, Willisville, Ont.; directors: Sid. A. Erwin, Detroit, Mich.; William Benziger, Chicago; W. A. Werrett, Toronto. The company began mining late in 1920.

It is the intention of the company to produce refined arsenic, as well as gold; with this end in view a second-hand arsenic kiln that went through the ice on Charlton lake in March, 1921, this machinery is now on the property, but is not set up.

Majestic Gold Mines, Limited.

The company was incorporated on January 24, 1921, with a capitalization of $1,000,000 in $1.00 shares. The head office is at 213 Carlton Street, Toronto, and the directors are: president M. A. Attalah, Toronto; Saad

Lattief, Toroto; secretary, Charles Gregory, Parry Sound, Ont. This company owns patented mining claims in lot 4, concession 11, Beatty township, and has a five-year option on six claims in Coulson township, viz., L. 6417, L. 6418, L. 6419, L. 6420, L. 6421, and L. 6422; both these groups are reached from Matheson on the T. and N. O. railway. In April the company began to prospect under option four claims beside the Algoma Eastern railway on the north shore of Miles lake and about half a mile west of West River station; this station is at railway mileage 63.4. Three of these claims are S. 4706, recorded in the name of J. G. Pollard, and S. 4730 and 4731, recorded in the name of George Craig; the number of the fourth claim was not ascertained.

The vein being tested is in quartzite, or arkose, and has a strike of S. 46 degrees E. for 3 chains and N. 68 degrees E. For 8 chains. The vein consists of quartz, white, gray and in places almost black. The average width of the vein for this 11 chains is approximately 8 feet; at one point it is 16 feet wide. Not much mineralization is visible on the surface, but in a test pit which was recently started, occasional bunches of pyrite occur.

Seven men were working on these claims under the direction of Peter Greco. A very small boiler was being used to supply steam to a plugger drill.

The Howry Creek area is also described in the Summary Report of the Geological Survey of Canada for 1917, Part E.*

* See our issue 25 March 1921, p. 226.

WORLD'S COAL INDUSTRY IN 1920.

An interesting report has been issued by the United States Geological Survey giving a review of the world's coal industry during the year 1920. It points out that the prices reached were the highet of modern times, and, as usually happens at such a time, the quality of the output deteriorated. In the last two years of the war the world's outpnt had risen close to the pre-war level. After the Armistice, however, the cessation of munitions manufacture and the delay in resumption of normal business curtailed the demand for coal. Industrial disputes, both in Europe and America, closed many mines late in 1919 and further reduced the supply. Thus, when in 1920 the world set his face to work again and industrial activity was resumed where resumption was possible, consumers' reserves of fuel proved insufficient, and an almost universal feeling of apprehension over the coal supply swept around the world. The reasons for this alarm — lately a thing of the past — become clear when the world's production in 1920 is cast up.

The World's Production of Coal, 1910-1920.

Year	Production (in part estimated) Met. tons	Per cent produced by U. S.
1910	1,160,000,000	39.2
1911	1,189,000,000	37.9
1912	1,249,000,000	38.8
1913	1,342,000,000	38.5
1914	1,205,000,000	38.6
1915	1,196,000,000	40.4
1916	1,296,000,000	41.4
1917	1,345,000,000	44.0
1918	1,331,000,000	46.2
1919	1,158,000,000	42.9
1920	1,300,000,000	45.1

The fluctuations in world coal supply become somewhat clearer if expressed as index numbers, taking the output in the year 1913 as equal to 100. The production in the other years then becomes as follows:

1910 .. 86	1914 .. 90	1918 .. 99
1911 .. 89	1915 .. 89	1919 .. 86
1912 .. 93	1916 .. 97	1920 .. 97
1913 ..100	1917 ..100	

These figures are necessarily in part estimated, for official statistics are slow in coming in, but the margin of error in the total probably does not exceed 1 or 2 per cent.

In comparing the 1920 output with that of the years before the war, it must be remembered that the world's consumption normally increases by leaps and bounds. The average yearly rate of increase in the 20-year period preceding August, 1914, was 38,000,000 tons.

The decrease in output centring in Europe may be likened to a condition of vacuum. The stimulus of demand was felt not only in neutral countries of Europe — Spain and Holland — which developed their scanty resources to the utmost, but extended to the Americas, Africa, and Asia. Japanese, Chinese, and East Indian mines took over the bunkering business relinquished by the British in the Far East. In the bitterness of Europe's need American coal was shipped through Trieste and Fiume to Austria, or carried up the Rhine to Switzerland, passing within gun-shot of the great Ruhr field of Germany. Considerable tonnages were brought from South Africa. Even the East Indies and far-away Spitzbergen felt the stimulus.

The manner in which the outlying countries came to the assistance of Europe is shown in the following table, which gives production, by continents, before and after the war:—

Production of Coal, by Continents, 1913 *and* 1920.

Continent	1913	1920	Per cent of change
North America	531,600,000	601,300,000	+13.1
South America	1,600,000	1,700,000	+ 6.2
Europe	730,000,000	597,500,000	—18.1
Asia	55,800,000	75,800,000	+35.9
Africa	8,300,000	11,800,000	+42.2
Oceania	15,000,000	11,900,000	—20.7
World	1,342,300,000	1,300,000,000	— 3.2

PERSONALS.

Col. John I. McLaren, of Hamilton, and Lieut.-Col. Lawrence Martin, of Ottawa, have been appointed members of the Temiskaming and Northern Ontario Railway Commission.

Hon Edgar N. Rhodes, president-elect, and Captain D. Vogt, retiring president of British America Nickel Corporation, Ltd., are visiting the properties of the corporation at Nickelton. Captain Vogt is returning shortly to Norway, and will be in charge of the European end of the corporation's affairs. Mr. Rhodes is Speaker in the House of Commons, and it is said that he will retain that position after taking over the management of the Nickel Corporation's affairs.

Mr. Frank G. Stevens, of Toronto, is at the Rex Gold Mine in the Herb Lake district, Northern Manitoba.

Mr. Robert Bryce, who has been examining gold properties in Northern Ontario, has returned to Toronto.

NOTES FROM THE PAS.

Gold, Copper and Oil-Shale Prospects.

REECE H. HAGUE, The Pas, Man.

Interest in Northern Manitoba at present is divided between a new gold discovery at Elbow Lake, a copper find at Lake Athapapuskow and the oil situation.

Two brothers named Murray recently made a rich find at Elbow Lake, eight miles from the sensational discovery made by J. P. Gordon at Copper Lake two years ago. Samples of the ore brought into The Pas are the best yet seen in the district, the gold content running around $100,000 a ton. The discoverers are busy stripping the vein and many prospectors have visited Elbow Lake to get in on the new find.

The discovery was made on the edge of Elbow Creek, where the gold was very plentiful. Three hundred feet away the vein was again picked up and further free gold was discovered. The vein is said to have a width of 50 feet without uncovering the walls and the gold is fairly well disseminated.

The ore body lies in a greenstone formation, and is made up of porphry and quartz stringers. The overburden is not particularly heavy, it is reported.

Several prospecting parties had previously visited Elbow Lake, but only one discovery of any note had previously been made there. This was a gold find made by Thomas Webb in the fall of 1919, about miles from the Murray strike.

A large copper-sulphide body has been located by two prospectors named Baker and Patton, on Lake Athapapuskow. Samples brought into The Pas appear to be almost as rich as the Mandy ore and the body is said to be an immense one. Baker and Patton discovered a big sulphide body last year some distance from the scene of their present find and running parallel with it. The new body is situated near the mouth of the Pine Root River and extends down a bank eighty feet in height. It has been traced for a length of 200 feet and a width of 20 feet without finding the walls.

One Star Oil rig has already arrived at The Pas and will be transported 90 miles by barge and 12 miles by team into the Pasquai Hills, where boring for oil will be commenced at an early date. The rig has been purchased by a syndicate comprising a number of Saskatchewan men headed by George McMillan and J. Norton.

A very large territory has been staked for oil and several syndicates have been formed. It seems probable that other drills will soon be on their way into the country.

Mr. McMillan recently received an analysis return for samples of shale sent to R. Homrighous, Wichita, Kansas which showed a petroleum content of 17 imperial gals of oil per ton and 26 pounds of ammonium sulphate. The sample was taken from weathered surface shale, and the assayor stated that the oil was free in the paper shale and easy of treatment.

Professor R. C. Wallace, Commissioner for Northern Manitoba, has returned from a trip to the Pasquai Hills where he spent a fortnight investigating the shales. In the course of his report the doctor deals with the topography and geology of the country, devoting space to the various shales encountered. Dealing with the distillation of bituminous shales he says:—"Samples of shales of the various horizons of the Niobrara and of the top of the Benton were taken for analysis in order to determine which horizon carries more hydrocarbon. From rough tests in the field it would appear that the beds immediately below the hard limestone ledge, as they appear down the Man River, carry the highest value. The results of the analysis, which are not yet to hand, will settle this point. There has previously been an official analysis made of a sample which was taken by William McInnes of the Department of Mines, Ottawa. This analysis was:

Crude oil 7 Imp-gals per ton.
Sulphate of Ammonia 22.5 lbs per ton.

"The sample was taken from the shales underlying the limestone bed on the Man river, and from the scarp which would in all probability have lost some of the bituminous contents to be found, for instance, in drilling through the same horizon some distance back from the exposure. As is well known, the oil distillation industry has thriven in Scotland for many years, the average content of the shales being 16.35 Gals per ton in petroleum and 30.75 lbs per ton in ammonium sulphate. The shales are mined in Scotland from considerable depth, thereby adding much to the cost of mining above what would be necessary in surface operations such as are possible in the Pasquai Hills.

"The question of distillation of oil shales has become an important one on this continent in recent years, owing to the ever increasing price of gasoline, and the now well known oil-shale resources of Utah and Colorado. Many plants have been erected in the western States, some after the Scottish practise, but mainly with retorts built to suit the new conditions. Owing to the fact that, for some years at least, the market for ammonium sulphate will be limited on this content, while it commands a good price as a fertiliser in the British Isles, it is necessary to build up the industry on shales with a considerably higher oil-content than is mined in Scotland. Eventually there will be a large market for ammonium sulphate fertiliser, when the soils of the western plains reach exhaustion.

"The day of the oil-shale distillation industry on this continent is being hastened by the fact that demand now exceeds the production from the present oil-fields. It will probably be necessary to be assured of considerable sections of oil-shale with an average content of at least 40 gallons to the ton, exposed under conditions which will admit of steam-shovel methods of excavating before it will be advisable to consider operations. When the industry is established on a commercial basis in the western States, the most successful methods of operation there will serve as a guide in the Canadian fields. Dr. S. C. Ells of the Geological Survey Department will carry a full investigation of the shales during the summer."

Work is proceeding on the drill hole at Mafeking, some 70 miles from the Pasquai Hills, where good indications are said to have been secured and sands containing a large amount of bituminous matter encountered. The Manitoba Government drilling plant is operating at Winnipegosis, but up-to-the present many difficulties have been encountered and slow headway made with the work.

NO REDUCTION OF COAL RATES.

Mr. Edgar E. Clarke, chairman of the Interstate Commerce Commission, recently issued a statement in which he said that there were no proceedings pending before the Commission in respect of a general reduction of coal rates.

Outbursts of Firedamp in Coal Mines, and Control of Atmospheric Conditions in Hot and and Deep Mines

Digest of Papers Read Before the Institution of Mining Engineers, London, at the June Meeting.

(Reported by our English Correspondent.)

An important meeting of the Institute of Mining Engineers was held on the 9th. of June 1921 in London, at which two papers of great interest were read and other papers which had previously appeared in the proceeding of the Institute were discussed. Professor Henry Briggs, D.Sc., dealt with the "Characteristics of Outburst of Gas in Mines", first taking a general review of the gas outbursts which had occurred in various parts of the World and the lessons which may be learnt from them, and secondly, describing some special investigations and experiments which were carried out to determine as far as possible the reasons for the gas outburst at Ponthenry in Wales.

Firedamp is not so commonly met with in Britain as in Belgium, France and Silesia, but it occurs from time to time, and the case at Ponthenry would be classified as an outburst from solid coal, and is therefore of special interest. The outburst was not so serious as the gas disaster in France in 1907, when 4,000 tons of coal were moved, or the one at the Morrissey Colliery in British Columbia which displaced 3500 tons of coal, but it had nevertheless many features of interest and importanec.

The outburst occurred at a time when a "nip-out" had been reached in a seam of anthracite, normally consisting of an upper six-inch portion and a lower 32 inch portion. The depth of the seam was 900 feet. A slant of 7 inches per yard had been driven through the nip-out, and the face had reached 22 yards from the slant, when the outburst occurred.

The top coal was continuous and unaffected, but the lower coal was absent in the slant. The heading was turned off to explore the extent of the "want", and the bottom coal which was in a most friable state was immediately met with. The outburst occurred with great violence, so that in addition to the discharge of a very large quantity of gas 280 tons of coal was displaced, of which 170 tons was shot into the heading and slant. A large cavity was left in the place of the coal and subsequently another outburst occurred in the same part of the mine. There is no doubt that the coal was broken up and squeezed into its fresh position under very great lateral pressure, and one of the most remarkable features of the occurrence was that the upper coal had not suffered from this cause.

It has been the almost invariable case that outbursts of gas of this type from the solid coal have occurred during the driving of winning headings, or when "working in the whole" in bord-and-pillar mines. There seems to be no doubt that the best way to avoid danger from this cause is by working advancing longwall and by the avoidance of pushing forward the faces with too great rapidity. The slow advance of a wide straight face should enable the gas to drain quietly out of the coal.

In Europe it has sometimes been found advisable to prohibit the use of machine cutters in mines subject to these gas outbursts, as hand-cutting gives the gas a better chance to escape. It is also a good plan to carry out advance boring. A regular discharge of gas from the face is a sign of safety, and the stoppage of such a discharge should be regarded as a danger signal.

It has been shown by chemical analysis that the outburst coals from the Ponthenry seam contained a greater proportion of incombustible matter than the normal, and it seemed evident that the additional substances had become mixed with the ash by mechanical action rather than that they were present in solution. The invading substances was very high in acid insoluble and in silica and low in iron, and were doubtless caused by the churning up of the coal and soft rashing which usually separates the upper and lower coals, with the addition of some of the fireclay floor of the seam.

The action of South Wales anthracite most closely corresponding to the material of the outburst has been studied under experimental conditions, and it has been possible to come to some conclusions with regard to the gas given off and the reasons for the outburst. If the gas pressure was from 4 to 8 atmospheres, the fire-damp released would probably amount to from 49,000 to 53,000 cubic feet at 15 degrees C., calculated from the fact that about 7,200 cubic feet of coal were blown out or disturbed. One point which it is of importance to notice is that the coal ejected by these outbursts from the solid is dry, as the absorptive power of coal is greatly reduced when moist, so that outbursts of this type are not likely to occur in seams from which water exudes with gas at the faces.

If, however, water should enter for the first time into a virgin seam of coal which contains gas absorbed under pressure, an evolution of gas would take place, and, in the absence of outlets, the pressure might be increased. It is possible that this fact may have some bearing upon the problem of sudden outbursts from the floor and roof. It seems evident therefore that sudden outbursts of gas and coal from the solid are due to the co-existence of four factors, namely, the presence of gas under considerable pressure; the presence of a mass of disintegrated coal which is loose enough to move under a sudden relief of pressure and to set free almost instantaneously the greater part of the gas absorbed in it; the absence of water in the soft coal; and the employment of a method of working which affords little opportunity for the gas to drain quietly from the soft coal; or alternatively, the presence in the seam and surrounding a soft zone, of ribs of low permeability which prevent or interfere with that drainage.

The investigations carried out further showed that in the case of the Ponthenry outburst the phenomenon of activation played a part in increasing the volume of the gas absorbed by the loose coal. Activation is however not an essential factor, as normal coal can

absorb sufficient gas to cause outbursts if the necessary conditions exist.

Another paper of great interest was read by Mr. J. P. Rees. It was the third report of the committee on "The control of atmospheric conditions in hot and deep mines". This report gives data and statistics which have been collected from investigations carried out in a number of English collieries where temperature control is of unusual difficulty owing to the depth of the workings or other adverse conditions existing in the mine. The deductions drawn from the observations made are intended to show how the causes leading to high underground temperatures and high wet-bulb temperatures usually operate.

The instrument used in the test was a whirling hygrometer especially designed for underground work. It is constructed from two mercury thermometers of great accuracy held in cork pads by means of seccotine and set up in a wooden frame and guarded by metal bars. A slit enables the thermometers to be read when held against the light and an oval hole is cut in the frame for the bulb of the dry thermometer. The bulb of the wet thermometer is moistened by means of a strip of muslin which dips into a glass water reservoir at the base of the frame.

A handle for whirling the frame is provided and by rotating the frame at about 200 r.p.m. an air rate passing over the bulbs of about 600 feet per minute is produced.

The chief reasons for a rise in temperature in underground workings are three in number, heating due to the compression of the air as it descends the shafts and inclines, conduction of heat from the surrounding strata, and the formation of heat in the oxidation of coal, timber and other substances. The amount of heat and moisture given off by men, horses and lamps is a negligible quantity in coal mines. The increase in the moisture contained in the air of the mines is due to the evaporation of the water which percolates through the walls of the shafts and roads, or which may be present in freshly-exposed coal or other minerals.

It is only possible to reduce heating by compression at the expense of evaporation, but as the walls and shafts give off heat partly in accordance with the temperature of the external air on the surface, the underground temperature from this cause becomes more or less averaged throughout the year. Heating by conduction from the surrounding strata may be reduced to a very low figure by the passage of a sufficiently large volume of air as when once a zone of cooled rock has been created around a shaft or airway, the passage of heat through this rock is comparatively slow.

The different conditions which have to be faced in different parts of the world is strikingly brought out by the increase in the natural rock temperatures with increase in depth, in Britain and elsewhere. In the Witwatersrand area in Africa the rock temperature increase is about 1 deg. Fah. or every 250 feet increase in depth, whereas in the English collieries investigated in the research being described the increase is about 1 deg. Fah. for every 60 to 70 feet. The air temperature increase from compression in these collieries is about 1 deg. Fah. in 182 feet.

It therefore follows that the abundant ventilation of a dry deep mine in the Witwatersrand would warm the temperature, whereas in Britain it cools it. The investigations have further demonstrated that heating by oxidation can also be controlled by abundant ventilation.

An ample ventilating-air supply will also tend to keep the temperature of wet roads low owing to the evaporation which takes place and this again indirectly controls the amount of moisture in the air and the wet-bulb temperature. One of the points brought out by the investigation was the particularly rapid rise in moisture content of the air when passing along a working face over fresh and relatively moist coal.

CHANGES IN BRITISH EMPIRE COLLIERY STAFFS.

Alex. S. McNeill, General Superintendent of Mines announces a number of promotions in the superintendence staffs of the Dominion and Scotia collieries, namely:

D. H. McLean, Manager of Princess Colliery becomes assistant to the General Superintendent of the Dominion Coal Company. John Murphy, hitherto manager of the Jubilee Colliery, becomes manager of the Princess Colliery, and is succeeded at Jubilee by Thomas Merrit. Daniel Brown is appointed manager of the Florence Colliery, succeeding J. R. McNeill, who is appointed District Superintendent at Sydney Mines. The appointment become effective 1st July. The collieries formerly operated by the Nova Scotia Steel Company and separately managed from the head office of that company, are, by this announcement, constituted a superintendence district of the consolidated collieries of the Corporation, and will be managed from the office of the General Superintendent of Mines.

Shipments of coal to Britain and European ports from the Cape Breton collieries have steadily continued during the past few weeks. Although it is now probable that the 1st of July will see the end of the strike, stocks in Britain have been sufficient to prevent any acute physical suffering from the lack of coal, but after three months total idleness of the British collieries, the public is beginning to be painfully affected, and the shortage is by this time so pronounced that importations of coal will be needed for some time, as it will not be possible to obtain anything like full production from the collieries before the late Summer. The tonnage of coal which the Montreal market can take from Nova Scotia during the present season is not large enough to give an outlet for the full production of the Nova Scotia collieries, so long as the steel industry is not working full time, so that the European outlet which has been developed as a result of the British coal-strike has proven very welcome to the Nova Scotia coal companies. But for this, the collieries could only have worked part time during the Summer. The winter of 1920-1921 was a very hard one at the collieries, and the coming winter may be even a harder one, as business prospects are far from bright. The mine workers will therefore be wise to earn all that is possible during the remainder of the Summer, and to accumulate as large a reserve as they may find possible.

The Harbor Commissioners of the City of Vancouver are considering the purchase of a hulk for the bunkering of coal. The fleet of wooden war-built hulls on Lake Washington, near Seattle, which the United States Shipping Board is said to be anxious to dispose of, may be inspected with this in mind.

METAL PRODUCTION OF ONTARIO DURING FIRST QUARTER 1921.

Returns received by the Ontario Department of Mines from the metalliferous mines, smelters and refining works of the Province for the three months ending March 31st, 1921, are tabulated below. For purposes of comparison the quantities and values are given for the corresponding period in 1920. Tons throughout are net tons of 2,000 pounds.

		Quantity		Value $	
		1921	1920	1921	1920
Gold	ounces	111,096	142,840	2,296,522	2,953,036
Silver	ounces	2,106,045	2,280,665	1,226,551	2,954,695
Platinum metals	ounces	445	100	19,179	7,172
Copper metals	lbs	1,562,150	1,508,014	206,064	242,630
Copper in matte exported*	tons	222	1,976	35,520	553,280
Nickel in matte exported*	tons	519	4,571	259,500	2,285,500
Iron ore exported	tons	22	44	99	322
Iron, pig**	tons	16,208	13,428	467,538	344,241
Cobalt, metallic	lbs	81	46,479	365	108,430
Cobalt oxide	lbs	27,242	213,024	79,075	340,232
Nickel oxide	lbs	5,133	1,788,183	2,105	413,944
Nickel, metallic	lbs	2,855,698	2,159,316	1,000,240	753,163
Other Nickel compounds	lbs	2,364	159,183	189	15,308
Other Cobalt compounds	lbs	.....	1,417	.....	1,417
Lead, pig	lbs	809,440	509,075	42,832	48,278
Total				5,626,779	11,021,654

* Copper in matte was valued at 14 cents per pound in 1920 and 8 cents in 1921, while nickel was valued at 25 cents per pound for both years.

** Total output of pig iron was 147,345 tons worth $4,250,347. Figurees in the table represent proportional product from Ontario ore.

General Remarks.

The mineral industry with the exception of gold mining has suffered depression and a general lowering of values in common with most other industries. The nickel-copper and silver producers in particular have been affected—the former owing to lack of a market and the latter because of the prevailing low price of silver. Hydro-electric power shortage, as a result of unusually low water during the Fall and Winter months, had the effect of seriously curtailing the output of gold and also, to some extent, of silver. The iron and steel trade was very quiet during the early part of the year. More recently, however, there has been a decided improvement. The price of lead shows a marked decline, although the output is considerably in excess of the first quarter of 1920. Further details are given under the separate headings.

Gold.

Although the figures in the table show a decline in gold production as compared with the first quarter of 1920 this situation will undoubtedly be reversed for the first half of the year, the falling-off as explained above being due to hydro-electric power shortage. Since early in April an ample supply of power has been available and the Hollinger mine is treating 3300 tons of ore daily. The following table shows the output:

Source	Ore milled tons	Gold Recovery ounces	Gold Recovery Value $	Silver Recovery ounces	Silver Recovery Value $
Porcupine	241,353	100,477	2,077,048	17,935	10,568
Kirkland Lake	23,719	10,576	218,612	1,168	675
Total	265,072	111,053	2,295,660	19,103	11,243

In addition 43 ounces of gold worth $862 were recovered from nickel-copper refining operation. Gold mining companies received further a total of $331,356 by way of exchange premium, or as earnings on credit balances in the United States. Gold shipments go to the Canadian mint and are paid for by cheque on New York. Three mines at Porcupine—Hollinger, Dome and McIntyre were producing, and at Kirkland Lake—Lake Shore, Teck-Hughes and Tough-Oakes. In May the Wright-Hargreaves at Kirkland Lake commenced milling operations.

Silver.

Considering the combined disadvantages of power shortage, a decline in the price of silver and the fact that several properties are closed down, the output for the quarter is creditable. The average New York price of silver was 60.5 cents per fine ounce for the period as compared with $1.30 for the first quarter of 1920. The following ten mines made shipments: Nipissing, Mining Corporation, Coniagas, O'Brien, La Rose, Miller Lake O'Brien, McKinley-Darrage-Savage, Beaver Trethewey (Castle) and Bailey. In addition to 2,089,989 ounces shipped by the silver mines, there was a recovery of 19,103 ounces by gold mines and 2,953 from nickel-copper refining operations. The mines also received payment of $4,809 for 32,531 pounds of cobalt.

During the period southern Ontario refineries located at Thorold, Deloro, and Welland recovered 1,073,202 ounces of silver in addition to arsenic, nickel and cobalt in various forms. The market for all these products was poor and in consequence stocks have accumulated. The figures in the table refer to products sold.

Nickel-Copper.

Both the International Nickel Company of Canada and the Mond Nickel Company are operating on a greatly reduced scale from that of the war period. No shipments of nickel-copper matte were made during the period by the Mond Company to its refinery in Wales. Surplus stocks of nickel are gradually being absorbed. The British America Nickel Corporation shut down its smelter on Feb. 26th. A reorganization of the company is probable before work will be resumed. Meantime a small force has being doing some underground development work at the Murray mine. During the period 153,387 tons of ore were smelted and 7,568 tons of Bessemer matte produced. The latter contained 3,861 tons of nickel and 2,315 tons of copper. Of the total matte product 3,367 tons were shipped to Canadian refineries at Port Colborne and Deschenes, and 896 tons to the United States. The two refineries treated 2,554 tons of matte for a recovery of 2,853,512 pounds of nickel and 1,562,150 pounds of blister and ingot copper. The average New York price for electrolytic copper was 12.66 cents per pound for the first quarter of 1921 as compared with 18.93 cents in 1920.

Iron Ore and Pig Iron.

With the exception of a small sample shipment of hematite from the Wallbridge mine near Madoc, not a ton was shipped from Ontario mines. At the Magpie 42,198 tons of siderite ore were raised. Both the Magpie mine of the Algoma Steel Corporation and the mine at Sellwood owned by Moose Mountain, Limited, are idle at the present time.

During the quarter the Algoma Steel Corporation (Sault Ste. Marie) operated three blast furnaces for the production of pig iron, the Steel Company of Canada (Hamilton) two, the Canadian Furnace Company (Port Colborne) and Midland Iron and Steel Company one each. Of a total of 287,769 short tons of ore charged to the furnaces, only 31,597 tons or 11 per cent was of Ontario origin. Of the total output of pig iron 71,862 tons were used, along with scrap, in the production of 117,824 tons of steel worth $4,593,520.

Northern Ontario Letter

THE SILVER MINES.

The Cobalt Field.

Uniform quotation for silver is enabling the companies in the Cobalt field to take stock of their assets and to estimate with reasonable accuracy just what may or may not be done in the way of operating their mines. The leading mines are all realizing a substantial margin of net profit, and the trend of prices for supplies is still downward. The coming reduction in freight rates offers further promise of a continued decline, all of which contributes to improved economic situation and encourages the hope that some of the smaller mines which are still closed may be re-opened within a reasonably short time.

It is learned on good authority that a further cut in price of blasting powder may be expected at an early date. Competition will be keener within the next month or so than ever before in the history of mining in Cobalt. This is due to two or three new concerns preparing to make a bid for a part of the business of supplying the mines of Northern Ontario with dynamite. A substantial reduction in the price of this mining necessity would automatically cause a big drop in the cost of producing metal and would thereby widen the margin as between the cost of operation and the value of the metal produced.

High-grade ore has been opened up in a two-inch vein at the first level of the Buffalo Mine of the Mining Corporation of Canada. Very little work has so far been done on the new vein, and officials are unwilling to offer any estimate of its importance. The indications appear to be that it may "sweeten" the grade of the ore, however, which has been estimated to contain an average of 20 to 21 ounces of silver.

On July 15th the Kerr Lake Mines, Ltd., will pay a dividend of 12½ cents a share to stockholders of record July 1st. This will call for the disbursement of $225,000 and make a total of $9,085,000 paid so far to the stockholders of this company. The Kerr Lake is not producing anything from its Cobalt property, the work here consisting of exploration and development work. As regards the silver property acquired over a year ago in Utah as well as a gold dredging property in New Zealand, there is very little information available in Cobalt.

The find reported recently on the O'Brien Mine had no basis in fact, according to official information to the correspondent of the "Journal."

Work has been suspended on the Ophir property, following the shipment of one carload of ore. The property was being worked under lease, the royalty being ing subject to an increase on June 1st and a second increase July 1st. The leaseholders found the silver content of the ore too low to bear the cost of shipping.

Good results are reported officially on the Keeley Silver Mines. The mill is turning out about one and a half tons of concentrates daily, while at times it is possible to cob out some of the higher-grade ore which is being bagged preparatory to making a high-grade shipment in due course.

No new developments have been reported in connection with the negotiations in which one of the producing companies in Cobalt is negotiating for the purchase of the Silver Leaf property.

Niccolite has been discovered in a vein on block 45 in the Gillies Limit. The samples brought in have been taken to the assayer for analysis. The vein occurs in diabase formation and is about three inches in width. The owners of the property state they have also discovered galena in the vein and they believe it will show an encouraging silver content when sampled and assayed.

In a general way, there is more optimistic feeling among silver mine operators than has been apparent for several months in the Cobalt district. There are various schemes under way for opening idle properties which on one or the other might reasonably be attended with good results.

Elk Lake and Gowganda.

Reports are current in Elk Lake that another outcrop of hematite has been found not far from the Hartley-Wescott property. Details are lacking, and confirmation of the report could not be secured before the despatch of this letter to the "Journal." In the meantime, Messrs Hartley and Wescott are busily engaged in examining their property and securing an estimate of the extent of the high-grade iron ore occurrence.

Arrangements have been made to resume work on Downey property, situated between Elk Lake and Silver Lake. J. Darroch has been in Elk Lake making preliminary arrangements and plans an aggressive scheme of exploration work. Some years ago, the owners of the property took out about $10,000 in high-grade ore from the surface of the Downey claim, but nothing was done toward developing the property underground. It is now proposed to go ahead with an underground exploration and development scheme. Among other things, the death of Larry Downey, the original owner, caused the prolonged suspension of work on the property.

In the Gowganda district, the tendency to await the building of the proposed Northern Light Railway continues, and the indications appear to be that there may be a general revival of activity should the laying of rails become a reality. The railway project in the meantime depends upon the ability of its promoters to dispose of bonds which it has received authority to sell, these amounting to $15,000 a mile for a total for each mile of line constructed, up to as much as 100 miles. In addition to this, the Ontario Government is considering the question of itself subscribing $3,500 per mile, this is to be done through the Northern Development Branch instead of through the T. & N. O. Railway.

THE GOLD MINES.

The Porcupine Field.

During the month of May, the gold mines of the Porcupine and Kirkland Lake fields produced upwards of $1,300,000. The output for June will be known during the coming week and may show a still further increase. This would tend to show that during the last eight months of the current year, as from May 1st, the output of gold from these districts will reach close to $11,000,000. Added to this is a little over $3,000,000 produced during the first four months of the year when the mines were restricted in their operations on account of a shortage of hydro-electric power. An estimate of $14,000,000 for the current year, therefore, seems to be quite conservative, and compares with a former high record in Ontario of $11,381,000. There is also the fact that further milling additions are being made, and that by the end of the year or the beginning of the

next year the mines may be turning out gold at the rate of $1,500,000 monthly, or equal to $18,000,000 a year.

In regard to the harnessing of Kettle Falls on the Abitibi, it has just been learned that the Abitibi Power and Paper Company desires to control the Falls, claiming "prior right." In the meantime, it is understood the Ontario Government had authorized the Hollinger Consolidated Gold Mines to go ahead and develop the power, toward which end the Hollinger recently sent in a party of men to make a topographical survey. The Abitibi Company has created a big storage basin at the head of the Abitibi River, and the desire of this company to control possible hydro-electric development down river seems logical. At the same time, however, the Abitibi has already harnessed Iroquois Falls, as well as just completing the harnessing of Twin Falls, which two plants provide between 50,000 and 60,000 h.p., thereby providing an abundant supply of energy for the requirements of the Abitibi itself. It is generally believed that any difference of opinion that may exist in regard to Kettle Falls will be satisfactorily adjusted and that the Hollinger will be permitted to go ahead with its scheme to utilize this energy for the benefit of the gold mining industry, at the same time, keeping in mind the expense incurred by the Abitibi in providing and maintaining water-storage facilities which directly benefit all power developments down the river.

At the Dome Mines, the low-grade product of the American Cyanimid Company is being used instead of high-grade cyanide from the Cassel Cyanide Company of Glasgow. Details in regard to the results achieved have not been secured.

A part of the grinding equipment which is intended to add about fifty per cent to the capacity of the McIntyre-Porcupine Mines has arrived at the property but the work of installation has not yet commenced.

A small force of men is at work on the property of the Big Dyke Gold Mines. This company controls what was formerly the McRae-Porcupine, as well as having taken over the Pike Lake property and two other mining claims situated in the township of Ogden. The company's engineer, Lieut. F. G. Huycke, is in favor of sinking on a vein which occurs in a contact between Keewatin and a small strip of porphry, instead of carrying on diamond drilling operations. The officials are now bending their energies to the task of raising money with which to finance the work planned.

A road is being cut through the township of Shaw for the purpose of putting the Triplex property in touch with South Porcupine. The Triplex was formerly known as the Tommy Burns, and a force of men are already engaged in doing exploration work.

Kirkland Lake Field.

Although the deposits of ore are not so large in Kirkland Lake as in the Porcupine district, yet it is already apparent that the Kirkland Lake district will have as many producing mines as Porcupine. There are four now producing, with two more to be added by the end of the current year, while many outlying properties offer promise of developing successfully.

During recent weeks, engineers and representatives of men with money have been scouring the Kirkland Lake field for proven or prospective gold-mines and during the next few months there will probably be a lot of new capital employed in opening up one or another of the promising new properties.

The White-Kirkland is the name of a new company with an authorized capital of $500,000 which has just been formed for the purpose of taking over and operating property in the Kirkland Lake District.

During the month of May, the Lake Shore mine produced $29,637.18. The mill ran 93.55 p.c. of the possible running time and treated 1,865 tons of ore. This was an increase over the April output, but is still below normal in point of value produced. As to this, your correspondent interviewed Harry Oakes, president of the Lake Shore, and was informed that from this date forward the grade of the ore would be more uniform. Mr. Oakes explained that during the past few months the ore has been coming from development work and that a stope which was being driven entered a lean streak all of which was sent through the mill without stopping to draw any of the large tonnage of high-grade which is broken and lying in the stopes. Now that the shaft has been completed to the 600-ft. level, and with lateral work already under way at that depth it will be possible to regulate mill heads. Mr. Oakes stated that no effort would be made to enlarge the mill at present. He stated that the tank and other equipment was adequate to deal with an output of about $500,000 annually and this amount can be produced with the present 60-ton equipment. At a later date, when development has reached a point where the management feels justified in going ahead with further construction, the question of adding aquipment about three times the size of the present plant will be taken into consideration.

Boston Creek District.

The financing campaign, set for the month of May, to dispose of a bond issue of $50,000 amongst existing stock-holders of the Miller Independence is proceeding slowly but satisfactorily with some $10,000 or $12,000 yet to be subscribed.

As soon as the full $50,000 issue is subscribed, the diamond drilling program will be put into active operation, the starting of the new work being conditional and co-incident with the completion of the financing campaign. In the meantime preparatory work is in progress and the laboratory sampling and concentrating outfit is being installed ready to go into commission when required.

Miller Independence is at present the centre of considerable road-construction activities, the highway from Boston Creek to the Skead goldfield running east and west through the property while a government contract has just been let for clearing a two mile section from the mine south towards Krugerdorf. This piece of work when completed, will put the mine in direct road communication with Cobalt via Englehart and the Company is rendering all co-operative assistance in its power to have the work expedited.

CURTAILMENT ASBESTOS PRODUCTION.

A New York letter to asbestos users states that half the producing asbestos properties in Canada are closed down, and that the remainder of the mines are working on one shift for five days weekly, with the intention of suiting the supply to the reduced demand. It is expected, according to this New York advice, that the idle mines will not reopen for production until next Spring. No reduction in prevailing asbestos prices is expected, and consumers are advised to stock sufficient supplies to fill their requirements until next Spring.

TORONTO MINING QUOTATIONS.

Quotations on Active Stocks on Standard Stock Exchange for Week ending 25th June 1921:

	High	Low	Last
Silver.	**High**	**Low**	**Last**
Adanac Silver Mines, Ltd.	1	7/8	1
Coniagas	1.75	1.75	1.75
Crown Reserve	10	9½	10
La Rose	23	23	23
Mining Corp. of Can.	1.17	1.05	1.05
National	4.75	4.60	4.75
Ophir	1½	1½	1½
Temiskaming	21	20½	20¾
Trethewey	16½	15	15½
Gold.			
Apex	1½	1½	1½
Atlas	23	20	20½
Dome Lake	5	5	5
Dome Mines	19.75	16.75	18.50
Gold Reef	3	2¼	2¼
Hollinger Cons.	7.25	7.09	7.20
Hunton Kirkl'd G.M.	43½	40	40
Inspiration	2½	2½	2½
Keora	11½	10	10½
Lake Shore M. Ltd.	1.20	1.12	1.12
McIntyre	1.90	1.85	1.87
Newray Mines, Ltd.	5¾	5¼	5¼
Porcupine Crown	16½	12	13
Porcupine V.N.T.	19½	16	16½
Schumacher	22½	21	21
So. Keora	17	15½	17
Teck-Hughes	12	11½	12
Thompson Krist	5	4½	4½
West Dome	6¼	6	6¼
Wasapika Gold M. Ltd.	9	8	8⅜

MONTREAL METAL QUOTATIONS.

Following are the fair average prices for ingot metals (in less than car-loads) at Montreal:

	June 22.	June 29.
Copper, electric	17¾	17¾
Copper, casting	17½	17½
Tin	36	36
Lead	6½	6¾
Zinc	7¼	7
Aluminum	31	31
Antimony	7¼	7¼

TORONTO METAL QUOTATIONS.

Below are the fair average prices for ingot meals (in less than car-loads) at Toronto:

	June 29.
Copper, Electric	17
Copper, Casting	16¾
Tin	39
Lead	7
Zinc	7½
Aluminum	30
Antimony	9

(Unchanged from previous week.)

Dr. G. A. Young, of the Geological Survey, is on his way to the Belcher Islands, Hudson Bay. Important iron ore deposits have been found there in recent years.

TORONTO COAL PRICES.

Toronto, 29th June.—To say that there are market conditions, but no market, about sums up the coal situation in Toronto. There is really no market. Throughout the entire Province, retailers are pretty heavily stocked up with coal, but consumers will not buy. In fact, so heavily stocked are some retailers, that a number of them have had to cut off shipments altogether because of the physical impossibility of handling coal by reason of lack of space. Present Toronto prices are: Slack coal, $1.00 to $1.75; lump coal, $2.10 to $3.00; smokeless mine run, $2.10 to $3.35. Anthracite prices, as given last week, will all be advanced 10c. on the 1st July. In addition, on the 1st July, there will also become effective a Pennsylvania State tax of 1½ per cent. on the price of the coal at the mines. This State tax is meeting with opposition on the ground of unconstitutionality, and the legality of its imposition will be tested in the courts. In the Pocohantas market, slack is a little easy, but the lump market is very stiff, prices being as follows: Slack, $1.25 to $1.90; lump, $5.50 to $6.00; Pocohantas mine run, $3.50.

BRITISH-AMERICA NICKEL CORPORATION ANNOUNCES RE-FINANCING.

A despatch from Ottawa under date of June 20th announces that the British America Nickel Corporation, Ltd., has definitely carried through its re-financing scheme and the corporation's capital is now arranged for as follows: $6,000,000 first income bonds; $18,500,000 second bonds; $20,000,000 common stock.

The corporation which has temporarily shut down its plants, is only waiting for the right time to resume operations.

Captain D. Vogt, president of the Norwegian Nickel Works, has, during the financing period, been in charge of corporation's affairs. From the first of July, however, Hon. Edgar N. Rhodes, Speaker of the House of Commons, will take charge of British America Nickel Corporation, Ltd., having been appointed president and managing director of the corporation. On the same date, Capt. D. Vogt resigns as president, having been elected vice-president of the corporation and managing director for its European office.

A. Gronningsater, who up to the present, has acted as chief consulting engineer, has been appointed technical director and S. M. Brown, secretary-treasurer, has been elected a member of the board. Some other members of the board of directors of the corporation are: J. Fred Booth, Ottawa; F. W. Field, Toronto. Sir Eric Hambro, London, England; E. R. Wood, Toronto; Sir U. J. R. Borresen, Christiania, Norway.

The corporation's mine and smelter plants at Sudbury and its refinery at Deschenes, Quebec, are of most modern and adequate construction, and have a capacity of up to 10,000 tons of nickel per year. The plant managers are respectively: E. Hibbert, E. J. Carlyle and R. L. Peck.

The mine property itself as well as the plants and the smelting and refining processes, have recently been very favorably reported upon by independent mining and metallurgical experts, and the company can, no doubt, look forward to a successful future as soon as general trade conditions improve.

British Columbia Notes

Stewart, B.C.—It is said that the Guggenheims have acquired the Forty Nine Group of Mineral Claims, Salmon River, which was located in 1910. The Woodbine Group, situated on Cascade Creek and close to the Premier Mine, is reported to have been sold through the efforts of Pat Daly, the prospector and operator whose recent New York activities received considerable publicity.—No active mining operations are being carried on at the Premier Mine at present. The management is concentrating on the work of the completing the Mill, putting the tramway in shape for the handling of the output, 100 men being engaged on this alone, and in general construction and development in and around the property. Over 1,000 tons of ore has been sacked and awaits shipments.—R. L. Clothier, superintendent of the Red Cliff, has taken in a gang of men to establishment camp preparatory to the initiation of systematic development.—In explanation of the closing down of the Spider Group of Mineral Claims, as well as of the failure of the Algunican Company to continue development plans on other properties in the Portland Canal District, it is said that the rate of exchange against Belgian capital finally forced investors of that country to close down on advances. F. C. Drumm, a legal gentleman of Orange, California, and N. V. D. Brock, of the same town, are quoted as saying that American interests may assist in financing the company's enterprises. If the money is forthcoming development on the Spider Group will continue. It is considered a promising mining property. The Red Top Group, of the Bear River District, is to be developed further this summer. G. Sieffert is reported to have obtained necessary financial backing in New York. The property is on the north side of the Bear River about 21 miles from Stewart and discussing it in his 1919 report George Clothier, resident mining engineer, said: "The lowest showing, at an elevation of 2,550 feet, consists of an open cut, 15 feet deep at the face, exposing a slightly mineralized, broken-up oxidized, slaty-looking rock about 15 feet in width. The hanging-wall of a coarse-grained igneous rock, probably andesite, is well defined striking east and west into the hill and dipping 60 degrees to the north. Sufficient depth has not been gained to get any idea of what the solid vein matter may be. Above this cut, about 15 feet, another cut has been excavated and the overburden stripped from the vein for a further distance of 50 feet, showing the same decomposed and shattered slaty material as below, slightly mineralized with chalcopyrite. Seemingly the shattered slates have absorbed the surface iron-oxides until the whole is a soft earthy mass. At 2,600 feet elevation the vein has been stripped for a length of 100 feet or more along the side hill, exposing in places ribs of fairly good chalcopyrite ore. There does not appear to be any definite strike or dip to the vein at this point, or to the hanging wall, which was so well defined below. It seems to be a mixture of bunches of sulphides in quartz, country-rock, and oxides, all blending into the country-rock above. About 15 feet is the greatest depth obtained anywhere and it will necessitate extensive exploratory work to define the vein and prove the ore-bodies. "The work planned consists of the driving of three crosscut tunnels, two of which were started last year. The lower one is expected to cut both leads in about 160 feet and the upper will cut the upper vein at about 125 feet. A new tunnel will be opened up some 800 feet west of the present workings to cut the upper vein. The intention is that each of these tunnels shall cut the leads from wall to wall, thus permitting drifting on them both ways.

Alice Arm, B.C.: While there is not much, if any, prospect of actual shipping from this district at present the explanation is not to be found in any lack of mining opportunity but in the metal markets and general financial conditions. The Dolly Varden Mine is to be further developed and work, it is understood, is to be carried out on the Wolf Group, situated adjacent to the Dolly Varden Claims. Meanwhile the community is optimistic, some road work is being done by the government, progress is being made in the improvement of wharf accommodation, and the prospectors are hitting the trail for the hills of the Kitsault and the Illiance rivers.—On the Bellevue property, it is reported, a promising lead of first-class ore was struck at a depth of something over 100 feet. The striking of ore at depth is considered of first importance in the upper Illiance country indicating that the ore bodies are not confined to the surface, or to the near surface. It adds to the possibilities of the many rich surface indications of the district.

Anyox, B.C.: Col J. T. Crabb, New York, executive vice-president of the Granby Consolidated Mining, Smelting & Power Co. Ltd., was most optimistic in a statement made while on a recent visit to northern British Columbia. He is quoted as follows: "Copper is not the only mineral in British Columbia. Though it is rich in that mineral it is quite rich in gold and silver and many other valuable minerals, including iron. If much has been taken out of the province, it is nothing to what remains. Why, the country has not been scratched. It is very rich in minerals."

Hartley Bay, B.C.—The Drum Lummon Mines Ltd henceforth will be known as the Douglas Channel Mines Ltd., this change having been decided upon at a recent meeting of the shareholders held in Vancouver. Officers were elected as follows :President, John Broatch; secretary, J. F. Meads; directors, Dr. T. D. Turner, Penticton; Theed Pearce, Courtenay; W. Patterson, J. Tomand, J. T. McGregor, of Vancouver Operations are to resume at the mine shortly on a considerable scale. It is probable that the plant will be overhauled and altered and that new development will be undertaken.

Trail, B.C.—The smelter of the Canadian Consolidated Mining & Smelting Co. continues busy with the product of the company mines. Between the 10th and the 17th of June some 7,540 tons of ore from this source were treated. A shipment of 93 tons was received from the Florence Silver Mining Co., Princess Creek, near Ainsworth, and the Knob Hill, of the Republic Camp, is credited with 162 tons.

Nelson, B.C.—Development work is to be resumed at the McAllister Mine, Three Forks, after July 1st, it being the intention to bring the property up to the point of being able to produce on a milling scale. The installation of a concentrator next Spring is contemplated.

Victoria, B.C.—Much interest is manifested in a report issued by the Imperial Mineral Resources

Bureau showing that the output of zinc from Canadian mines has more than quadrupled since 1916. Previous to that time the production was negligible and the Bureau did not keep a record of it. In 1916 it was 2,655 and in 1919 it had jumped to 11,005 tons. Discussing the output within the Empire the Report attached special significance to the zinc-lead silver ores of this Province and to the development of facilities for their treatment at the Trail Smelter. "Much still remains to be done" it is stated "before the British Empire can be considered to be self supporting in the matter of spelter production." A hopeful indication was the construction of a successful plant at Trail, B.C., with a capacity of 15,000 tons of smelter a year.

The Imperial Oil Company's drilling crew has left Edmonton for Fort Norman, A. W. Harris being in charge as superintendent of the company's field work in this district. Bear Island, opposite the site of the present well, has been selected as the season's headquarters. T. A. Link, the company's geologist, will have chosen sites for further drilling before the arrival of the main expedition. — Wm. Nicholson, of Banff, Alta., states that he is planning active operations on his claims at Fort Norman, and the Stewart Oil Company, promoted by a group of Calgary, Alta., investors, is reported to have arranged with drilling contractors for drilling at Fort Norman and Windy Point.

The oil shale deposits of Graham Island, Queen Charlotte Islands, are being thoroughly tested, a small plant having been installed for the purpose. While the results are not yet known those responsible for the work are confident of success. It is thought that it can be demonstrated that shale running 20 gallons to the ton can be profitably handled. Surface shale is reported to show an oil content of from 7 to 10 gallons to the ton but much work must yet be done in prospecting and determining the limits of the belt of oil-bearing shales. The deposits are on the west slope of the Island.

Preparations for the exploratory work of the Imperial Oil Company in the Ponce Conpé District of Eastern British Columbia, practically on the border of this Province and the Province of Alberta, are well underway. Wet weather at the beginning of May interfered with the work of transporting plant and supplies but since then conditions have improved. All the equipment and the casing necessary for the first well, however, is on the ground. An unusually heavy outfit is being used for the first well. It drills a 21-inch hole and is capable of going to a depth of 4,000 feet. The hole is being sunk in close proximity to one of the seepages. The most promising of these is at the junction of Tepee Creek and the Ponce Conpé River. Oil, it is stated by geologists, is most likely to be found either at a depth of 700 or of 3,300 feet. Negotiations are said to be in progress for the purchase of 200 sections of land in the district by New York capitalists and it is probable that between fifteen and twenty drills will be operating in the field within the next two or three months.

The Kitsumgallum Basin Petroleum Co. Ltd. has been incorporated in British Columbia with a capitalization of $300,000, head office Terrace, B.C., the objects of which are to prospect for and develop oil properties on the Kitsumgallum Lake. A number of promising indications are said to have been found and several claims in the neighborhood of Beaver and Cedar Rivers have been recorded.

Coal operators, dealers and consumers were represented at a conference with Hon. Mr. Sloan, Minister of Mines for British Columbia, held on the 9th of June for the purpose of considering the possibility of producing coal that will retail at a cheaper rate than at present.

The discussion was based on the recommendations of Mr. Alex Henderson, K.C., who recently conducted an inquiry into the coal industry of the Province, and of General R. G. E. Leckie, B.Sc., who was Mr. Henderson's technical counseller.

Taking the recommendations seriatim the Conference's sentiment generally speaking was as follows:

That there would be no practical purpose in changing from the long to the short ton in all sales. The Canadian Collieries (D) Ltd. explained that only about 9 per cent of their sales were for the domestic market and that all deliveries by bunker to mercantile trade were computed in long tons.

That there was no objection by the operators to furnishing the Government with reports of operating costs and sales realisations of their several mines providing the same were kept confidential. The companies, however, had competitors outside the Province and it was not right that they should be kept informed of the business of the provincial collieries.

That no power existed in the Province to license retail dealers. It would be quite as reasonable for the legislature to attempt to restrict the number of meat merchants as to undertake to regulate the number of coal dealers in any particular area or district.

That the suggestion that all larger users should lay in their coal during the summer was a good one and that such a practice should be encouraged in every possible way.

That there was no objection to the publication of the analyses and characteristics of the coals of the several mines of the Province while it was doubted whether any good purpose would be served inasmuch as the coals of Vancouver Island and most of those of the lower provincial mainland were very similar—a high-class bituminous coal.

That lists already were available setting out the different grades of coal the several uses to which the different coals may best be applied and the prices.

That it would be a useless duplication of machinery for the Province to appoint a Fair-Weights Officer because the municipal officials of Victoria, Vancouver and New Westminster already were efficiently taking care of this work. The coal dealers scored here when the Fair-Weights Officer of Victoria in person reported that in 1919 and 1920 the loads which went over his scales for the most part were slightly over-weight, some were exact, and very rarely was one found any short. At this point the dealers took occasion to show their resentment of the suggestion of Commissioner Henderson that the public had been short-weighted. They declared that the coal dealers were an honorable body of businessmen who protested against such an aspersion inasmuch as there was no evidence in its support. No doubt there were some instances of short weight because of the dishonesty of carters who held back an occasional sack and sold to peddlers. One dealer told of a specific instance of this and an alderman representative of Vancouver said that the practice would be stopped. The latter added that the cor-

poration's equipment for coping with this question had been improved recently and that the public would be assured of full weight not only in coal but in all other commodities. The dealers re-asserted that they were not responsible but if anything, lost in quantity in the redistribution of coal from their bunkers to the consumers.

That residences in the west should be constructed hereafter with provision for delivery in bulk of coal, wood, and other fuels was a suggestion receiving unanimous endorsation.

That combines formed to keep up prices should be dissolved was not disputed although the dealers said that their organization since declared *non est*, was not for that purpose but was designed to promote efficiently in distribution by the interchange of ideas and general co-operation.

That operators should be compelled to supply coal to any person demanding a quantity not less than 40 tons was stoutly opposed. This, it was said, would lead to a crop of "snow-birds"—irresponsible dealers peddling from hand to mouth only in the winter, would discourage the storing of quantities of coal by regular dealers, and might result in a dangerous shortage of fuel at a time when it would be essential to householders.

That recommendations 11, 12, and 13 were not controversial. There was no doubt that there should be less waste of coal by-products and if study would have that effect it was desirable. It was equally true that the greater use of pulverized coal would be an advantage but there were problems, at present apparently insuperable, connected with its general use for domestic and industrial purposes. Too expensive a plant was required for its use under ordinary average conditions. However the time might come when it would be more commonly utilized. The B. C. Sugar Refinery Co. Vancouver, now used it as a fuel, but it was exceptional, the plant being a large one and the facilities for burning complete. As for the reduction of freight rates, both by rail and water, from Nanaimo and other coal centres it was felt that anything that might be done to that end would be beneficial, but little hope was held out of accomplishment.

That standard sizes of coal should be established officially was a suggestion that did not receive support. The concensus of opinion was that any further segregation and sorting of the coal mined for the purpose of marketing would but have the effect of increasing retail quotations. Thomas Graham, general superintendent of the Canadian Collieries, explained that to make another size of domestic coal would cost his Company at one mine $50,000, which amount would have to be added to the cost. He told of screens having been installed at the Western Fuel Co., Nanaimo, for the production of an "egg" coal which coal never became popular. Hon. Wm. Sloan, the Minister, declared himself as opposed to the proposal. In Nanaimo he received for years ordinary "run-of-mine" coal and always found it satisfactory. He advocated the "pushing" by the dealers of "run-of-scow" coal, which was a high-class lump, in every respect suitable for domestic purposes. This, it was agreed, could be sold for $1 a ton cheaper than the "lump" coal now retailed, which is put over the screens by the dealers after it is taken from the scows. The dealers undertook to undertake an organized advertising campaign with a view to persuading the public to give this coal a trial.

That a set of scales should be placed on every delivery wagon or truck was ridiculed and passed over as being impracticable.

Announcement was made shortly that the Board of Railway Commissioners of Canada had issued an order providing for a 10 per cent reduction on coal shipments within the three prairie provinces, Alberta, Saskatchewan and Manitoba. This concession is to obtain only for the summer months—June 1st to August 31st.

Hon. Wm. Sloan, Minister of Mines, has entered a vigorous protest on behalf of the eastern British Columbia Collieries who thus are placed at a disadvantage in shipping to the Canadian prairie market. He pointed out that the Crow's Nest Pass Coal Co. and the Corbin Coal & Coke Co. are situated in District 18, U.M.W. of A., which comprises the eastern provincial coal fields and those of Alberta, that they are under the jurisdiction of W. H. Armstrong, Dominion Director of Coal Operations; and that they depend practically upon the same markets as do the collieries of the immediately adjacent coal fields of the Province of Alberta. It also was explained that in 1920 they shipped into the Winnipeg market 26,000 tons of coal and 2500 tons of coke.

In his reply F. B. Carvell, Chief Commission of the Railway Board, said that only a small amount of coal went into the prairies from British Columbia, that most of it was used largely for steam purposes and would not be stored in great quantities, and that the Board's object was to force the storing of coal during the summer months, thus releasing railway equipment for the moving of crops in the Autumn.

This was answered by Mr. Sloan by the statement that over 40,000 tons of eastern British Columbia coal went into the middle Canadian provinces in 1920 from the collieries of the Crow's Nest Pass Coal Co. alone and that this year's shipments, given favorable freight rates, would amount to over 75,000 tons; that the larger producers of the Province of Alberta operate steam-coal mines while the British Columbia Collieries are the only other mines shipping into the market covered by the Board's Order; and that it was clear that the stated object of the Order would not be realized "unless the source of the coal that is likely to be stored is given the advantage of the summer freight-rates." Mr. Sloan added that there did not appear to be much fear of the creation of a dangerous precedent "inasmuch as the British Columbia coal fields referred to are very little further west than those in Alberta that will be benefitted, and also for the reason that the more westerly collieries already are paying the higher freight-rates imposed because of their greater distance from the market."

The Board has again been asked to enlarge its Order to take in eastern British Columbia coal fields but as yet nothing further has been heard as to its attitude.

There has been considerable activity in connection with the development of coal measures along the line of the Grand Trunk Pacific Railway, anticipating, no doubt, the growth of a considerable domestic market, as well as bunkering trade, in the Port of Prince Rupert. The Telkwa Collieries, which have been working on a small scale, have not been producing for some months but are expected to re-open before the end of the summer. J. M. Gillespie is opening some measures on what is known as the Aveling

Property in the same locality. A road and bridge has been constructed to permit access to the railway and there is no doubt that coal will be shipped in some quantity to the Coast from this source. The Fraser Lake Collieries, Ltd., also are sinking a shaft on a coal seam situated on the shore of Fraser Lake. They have a good-quality bituminous coal. The Company has not yet obtained title to the land because of the present provincial reserve on coal but have complied with all the legal requirements, ordinarily called for, and expect that the reserve will be lifted.

OCCASIONAL NOTES

By Our TORONTO CORRESPONDENT.

At present the mining industry of Ontario looks to its gold properties in the North as its backbone. Most of its other mining properties are not paying and hence are for the time being, liabilities. At any rate, they are on the liability side. However, it is necessary to keep them in shape in order that they may produce revenue in the future. But there is no revenue to be got from them immediately.

One had hoped that the Ontario Government would have done something to encourage the mining industry. But it has done practically nothing. Everything is being done to encourage the farmers. They get help from the State in the shape of special railway rates to agricultural laborers. Prospectors and others interested in the mining industry need, at the moment, as much encouragement as anybody else—but no special rates for them! This is all wrong. Those concerned in the mining industry need to be cheered on as much as possible by both the Dominion and the Ontario Governments, and nothing to that end should be left undone by either.

The spokesmen for the present Ontario Government are never tired of expatiating on the beauty of life on the farm. But judged by any and by every standard, the worker in the mine has a far better time than the average hired man on the farm. The latter's time is not always a bed of roses; if one has to judge of it from a verse of a poem which the present writer has received from a hired man on an Ontario farm, and which professes to be descriptive of the life of the aveage farm help. The verse runs:

"Buck up when the clock strike five,
And yon wake on your small, hard bed;
One half of you just alive,
And the other half nearly dead.
Thirty minutes your "dinner hour,"
And but half of that time to sup;
Oh! in scorching sun or in drenching shower,
'Tis buck up for your life, buck up!"

The worker in a mine has better wages, and much shorter hours, he is better housed, better fed, has more facilities for recreation, better schooling for his children, and is better cared for generally than any hired man on a farm. But this is a side of mining that is quite insufficiently considered, and quite inadequately appreciated, by the general public. In fact, the general public knows very little of the exceedingly comfortable and pleasant conditions under which mining operations are carried on at the present day—at all events, in Ontario. There seems to be a prejudice against the occupation of the miner — a prejudice which probably survives from centuries long past when mining was the work of slaves.

This prejudice is totally unwarrantable today. The shaft that takes men down into and up from a mine is as comfortable and convenient as an office elevator. The work is steady and easy. The worker sets up a drill and then sits down and watches it do the work. If it goes out of repair, he must be able to make a simple repair. The shovelling is not as hard as shovelling on a street or farm. The machinery work is easy and pleasant and is performed under comfortable conditions. For all laborious work is done by machinery. Plenty of fresh air is supplied. The temperature is never too hot or too cold.

In fact, conditions for labor in Ontario mines are altogether ideal. There is no more danger to be found in working in them than is to be encountered from the traffic at the corner of King and Yonge streets, Toronto. In ninety-nine cases out of a hundred, the man who gets killed in a mine, gets killed by reason of his own carelessness or default. There is very little danger in the work so long as a man exercises proper care.

OLD-TIME COAL WORKINGS.

In the course of coal-getting at a number of pits which "strike" miners have sunk to work an outcrop coal seam on the Wrightington Estate, Shevington Vale, near Wigan, some old-time colliery workings, which penetrate long distances underground, have been discovered. The workings date back further than living memory, but the Liverpool Daily Post says that an aged native of Wrightington, the grandfather of the present agent of the Wrightington estate, who died fifteen years ago at the age of ninety years, had recollections of the seam being worked in his childhood days over a hundred years ago. This is borne out by an interesting relic, in the shape of a "Liverpool halfpenny," which has been found by the men in the long-abandoned workings. The coin which bears the date of 1791, would seem to indicate that this early Lancashire colliery was working 130 years ago, and it is recalled that before the days of railways, a wagon road, traces of which were formerly to be seen, ran from the site of the forgotten coal mine to the Leeds and Liverpool Canal, which is not far distant, and the coal could thus, prior to the railway era, be transported by water to Liverpool, Manchester, Leeds, and other towns by the canal. The "Liverpool halfpenny," discovered in the underground, after the lapse of over a century bears the representation of a sailing ship in full sail, and is in a good state of preservation. The miners on entering the old workings found plenty of coal awaiting to be got in the coal pillars which their predecessors of more than a hundred years ago had left to support the upper strata of surface soil. Thousands of tons of coal of excellent quality have been cut from the seam, which is about five feet thick, being the Arley Mine outcrop. Workings were started in the hillside and in the woods and a two-acre field was honeycombed with miniature pits from which the fuel was obtained. In one place the men excavated the seam from underneath a clump of beech trees to such an extent that one of the trees tilted over.

"Science and Art of Mining."

BOOK REVIEW.

FIELD MAPPING FOR THE OIL GEOLOGIST. G. A. Warner. 4¼ by 7 ins. 143 pp. Fabrikoid binding, pocket size. Price $2.50. John Wiley & Sons, New York. 15 shillings, London, Chapman & Gall.

The author of this little handbook is field geologist for the Empire Gas & Fuel Company of Bartlesville, Oklahoma. While the geological conditions under which petroleum may be expected to occur are reviewed in a brief but very effective manner, the book is really a strictly limited treatise on field surveying and topographical mapping as developed in practice to suit the requirements of oil mining, and is evidently compiled from personal experience in the field. A number of surveying tables are appended, and typical rock sections of the better-known oilfields in the United States are given. To those who have to undertake mapping of an undrilled oilfield the treatise contains many valuable practical hints.

FIELD METHODS IN PETROLEUM GEOLOGY. Cox, Dake and Muilenburg. 5 by 7½ inches 305 pp. with tables and Index. Fabrikoid Binding. Mc.Graw-Hill Book Co., New York and London.

This work discusses the minutiae of field procedure, as applied to the highly specialised work of oil geology, and is written for those who have at least moderate familiarity with the fundamental principles of geology, surveying and mathematics, including at least trigonometry. The introduction summarises what is known of petroleum occurrence. Following chapters describe field instruments and their uses, field procedure, and the geological criteria used in correlating beds and identifying structure. The authors are or have been all connected with the Department of Geology in the Missouri School of Mines & Metallurgy, at Rolla, Mo. A glossary is appended, and a number of surveying tables.

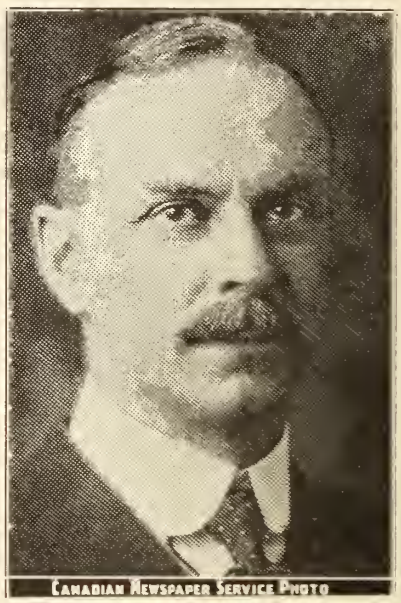
OIL LAND DEVELOPMENT & VALUATION. R. P. Mc. Laughlin, formerly State Oil and Gas Supervisor of California. 200 pp. by 5 by 7½ ins. Fabrikoid binding, $3.00. Mc. Graw-Hill Book Co., New York & London.

The author writes from experience in California, which leads him to believe that the necessity for careful and systematic development and conservation of oil deposits has not been generally recognised. Well-drilling, and questions of repairing, deepening and abandoning wells are dealt with. The extent and character of the information that should be assembled and recorded in oil production is indicated. The factors determining the value of oil lands are fully gone into in the concluding chapter. The book is well illustrated and contains many graphic charts and maps. The book seems to have real practical value. It does not discuss oil geology, but is confined to consideration of the steps necessary for the full and proper development of lands which have been determined to be oil-bearing.

ENGINEERING EQUIPMENT COMPANY OF MONTREAL.

The Engineering Equipment Company, Limited, Sales Engineers, Montreal, have recently moved from 263 St. James Street to more commodious quarters in the New Birks Building, Phillips Square.

This firm is composed of men well known in the engineering industry and is specializing in mining, contracting and industrial machinery. They have been fortunate in securing selling rights in Canada from some of the leading manufacturers of mining equipment in Great Britain and the United States. They are specially handling air-compressors, rock-drills, pneumatic tools, hoists and pumps.



Mr. Norman M. Campbell.

The officials of the Company include:

Norman M. Campbell, Managing Director of the General Combustion Company, Limited, and for many years General Sales Manager of the Canadian Ingersoll-Rand Company. Mr. Campbell is well known to both the Mining and Industrial Community.

Mr. Samuel Seaver, formerly Canadian Sales Manager for Sullivan Machinery Company and Canadian Rock Drill Co., equally well known to the Canadian Mining Industry.

Mr. F. H. McKechnie, formerly associated with McKechnie and McLaren, Sales Engineers, Montreal.

Mr. Samuel Seaver.

Mr. Percival J. Woolf, late Manager of the Duluth, Minn., office of the General Electric Company and for some time associated with the Chicago Pneumatic Tool Company.

The Company has recently opened a Pacific Coast Office at 60 Credit Foncier Building, Vancouver, B.C., in charge of Mr. J. N. Bell, for many years in charge of Canadian Ingersoll-Rand Company's work on the Coast. They have also concluded arrangements for the opening of a branch office in Winnipeg to handle the middle-West territory.

COPPER IN NOTRE DAME BAY, NEWFOUNDLAND.

The purchasers of copper areas in Little Bay, Notre Dame Bay, Newfoundland, formerly owned by W. A. Mackay, of North Sydney, N.S., have engaged the Sudbury Diamond Drill Company to drill the property, and S. J. Fitzgerald, president of the Sudbury Company, recently passed through North Sydney on his way to Newfoundland. The present shaft on the mine is down 1,200 feet, following a vein of high-grade ore which is stated to have run from seven to fifteen per cent. copper. There is said to be a large quantity of low-grade ore available, some of which is piled in a surface dump, and is amenable to modern treatment methods at a profit.

The Ontario Government railway, Temiskaming and Northern Ontario, carries four times as much mine products as farm products. The railroad was built chiefly to open up farming lands; but it has derived most of its revenue from the mining industry which resulted from its construction.

Owing to the increased activities and extension into a fully equipped engineering works manufacturing all classes of steel plate work and handling mechanical repairs of every description and also boiler repairs, the St. Lawrence Welding Company have, in order to make their name more representative of the field they are covering, changed their name to St. Lawrence Welding & Engineering Works, Ltd. No change will take place in the personnel of the firm. A. M. Barry, Vice-President and General Manager, remains in active charge. The head office and works are located at 138-140 Inspector St., Montreal.

The "Journal" for April 1st last contained photographs illustrating progressive destruction of a portion of the Carboniferous strata near Glace Bay, Cape Breton Island, being an addition to the series of views shown in the issue of 28th May 1920. By courtesy of Mr. B. A. L. Huntsman we are enabled to show a near view of the only remaining portion of the sandstone spur.

LIGHT RAILWAYS IN THE NORTH.

Relative Merits of Narrow-Gauge vs. Standard-Gauge Lines.

By J. A. McRAE, Cobalt.

The proposed construction of light railways to the outstanding mining areas of Northern Ontario is meeting with general support in all the districts which it is proposed to serve. Mining, lumbering and agricultural industries promise to receive added impetus as a result of being given much-needed rail transportation facilities.

There has recently been more or less discussion relative to the question as to whether narrow-gauge or standard-gauge would be the more suitable. The promoters of the project appear to have set their minds upon narrow-gauge lines such as were used in France for transportation of troops, munitions and supplies behind the fighting lines. Col. R. P. Rogers who is in charge of construction is a strong advocate of the narrow-gauge system.

Without any attempt to criticise, the writer has secured what information possible to gather hastily in support of a standard light railway, and submits the following as a suggestion which might receive the attention of the promoters of the Northern Light Railway Company.

Some Objections to Narrow Gauge.

In the first place, the construction of narrow-gauge lines will necessitate the transhipment of all freight and passengers at the point or points of junction with the standard railways. Secondly, the equipment used on narrow-gauge lines will be entirely useless on the standard mainlines and none of the standard equipment will be of use on the narrow-gauge lines. So much for the objectionable features of building a railway of a different gauge to those already in operation through this country. It presents the entire absence of desirable flexibility.

A Standard-Gauge Light Line.

There are many factors which appear to be in favor of the construction of a standard-gauge light line. The writer has enquired quite extensively into the subject, and some of the favorable features are these: The construction of a standard-gauge light line would entail very little more expenditure than the narrow-gauge line, perhaps even less for the reason that a good deal of the lighter rolling stock along the line of construction without the necessity of transhipment. The huge standard locomotives would, of course, be entirely too heavy to travel over the 56-pound rail which it is proposed to use. Further, the light road-bed which the estimated cost of around $15,000 a mile will provide would not allow these big locomotives to travel over the line. It is apparently for this reason that the 8 or 10-ton oil-burning locomotive has been selected, as best suited to haul the trains over the light line.

Therefore, to build light lines at the moderate cost estimated and keep to the standard-gauge, without using the heavy steam-locomotive, is the problem. The oil-burning locomotive would be employed at the sacrifice of the uniform gauge which is so desirable, and the one solution seems to be the employment of railroad motor-cars which have already been operated successfully on standard gauge lines, and which are cheaper than the oil-burning engine.

Case in Point.

According to T. J. Lee, vice-president and general manager of the Palatine, Lake Zurich and Wauconda Railroad Company, at Palatine, Illinois, where a railroad motor-car of the suggested type is in operation, it would appear as though the results achieved would commend the method to the promoters of this light line through Northern Ontario.

Costs Only 18 Cents Per Running Mile.

The cost of operating this railway motor-car is approximately eighteen cents per mile. This is made up of 2 cents for depreciation, 2 cents for repairs, insurance and so on, 7 cents for gasoline and oil, and 6½ cents for motorman's pay. Mr. Lee declares such a railroad motor-car in the passenger service will easily handle two trailers which will seat 40 passengers each

and accommodate a maximum of 100 people during rush hours. One of these cars in use on the line mentioned has handled 44 gross tons and pulled the load over a seven percent grade. It has also been found that the car has been useful in handling cars at terminals where a great deal of shunting is required and where as high as four loaded standard freight-cars have been moved about in switching. Were such a car to operate on a route say Elk Lake to Gowganda at 18 cents per mile, the round trip of 54 miles would cost just $9.72, which would be distributed over anything from 35 to 45 tons of freight. There would, of course, be the added cost of receiving and clearing the freight as well as the cost of administration and depreciation of the line itself. But all this appears small when compared with the expense heretofore of about $30 for each ton handled by teams. At this rate the cost of hauling 45 tons to Gowganda with teams amounts to $1,350, which tonnage could be handled in a single trip by the cheaply-operated railway motor-car.

Had such a line been operated during the past ten years to the centre of activity in the Gowganda district, the mining industry of that field would probably have attained much greater proportions. Such a line could have been built with the money which the Ontario Government has spent on the poor wagon-road which now serves the field, and this rail transportation would have saved many hundreds of thousands of dollars for exploration and development work which has gone into great waste incurred as a result of having to employ the inefficient wagon with a mere handful of material each trip.

EDITORIAL

OIL POSSIBILITIES IN THE PASQUIA HILLS, MAN.

Dr. Wallace has been good enough to forward a copy of his preliminary report on the search for oil in the Pasquia Hills district of Manitoba, which bears upon criticisms made in these columns in last week's issue of the statements and implications contained in the prospectus of the Pas Oil Development & Exploration Company. "While the possibility of the presence of oil pools cannot be excluded in any formation where the rocks contain oil, as in the Pasquia Hills, the evidences on the field would indicate that such a possibility is somewhat remote in the Pasquia Hills district". This is Dr. Wallace's conclusion regarding the country which includes the Turnberry areas, and emphasises the exaggerated character of the promises held out to those who invest money with the hope of vast returns from the drilling of these areas. Men who put their money into a drilling project of this kind, with the deliberate desire to test a territory for oil, are, if they can afford it, men whose enterprise is to be commended as adding to general knowledge, and holding out some hopes of personal profit. It is doubtful, however, if the average reader of the Manitoba "Free Press", guided by such an advertisement as that we have mentioned, would invest his money on any such understanding. This is of course an excellent explanation of the oil-promoter's deliberately misleading method of advertising, but it is certainly no justification of the method, and it is, moreover, one that should not be employed by men who desire to keep their reputations unclouded.

THE SULLIVAN MINE.

The chequered history of the Sullivan Mine at Kimberley, B. C., is described in this issue by Mr. Alexander Gray, from its inauspicious beginnings to the present time, when with the treatment processes developed by unremitting research, the undoubted presence of a very large ore-body makes it possible to class the Sullivan Mine in the first rank.

In view of the tonnages of ore and their metal content, Mr. Gray's statement that the public viewpoint of the Sullivan mine has been out of focus seems warranted. Temporary depression of metal markets does not, in the long run, impair the value of so vast a reserve of metals as the Sullivan property is believed to contain.

The importance of the metallurgical chemist is the most striking lesson of the Sullivan Mine. Insofar as the chemist has made the Sullivan ore available for merchandising, he has made the mine. It is such definite incidents as this that arouses the sardonic mirth of mining men when they read of the Senate killing a proposed research institute for reasons of economy. Many of Canada's metal occurrences are today in similar position to that of the Sullivan orebody before its profitable treatment had been worked out. The solution of such problems does not come by luck or fortuitously. They have to be worked out, and there is no royal road to the desired goal. It is fortunate that Canada has some large and enterprising corporations that can to some extent make up for the deficiencies of our parliamentary leaders, by ability to tackle national problems with almost as wide a grasp of national needs as that which should imbue the ideal statesmen.

A report by a competent geologist upon the probable origin and extent of the orebody at the Sullivan Mine would be of much scientific interest, and would seem a good thing for the Consolidated Mining & Smelting Company to have in any case.

SIR ROBERT HADFIELD, FRITZ MEDALLIST.

It was a happy thought of the federated engineering societies of the United States to send the Fritz Medal to London by the hands of a representative group of American engineers for presentation to Sir Robert Hadfield; and in thus signally honouring this eminent metallurgist, and, as is specifically stated, honouring the engineers of Great Britain for their engineering achievments during the war, our neighbours have given Canadian engineers reason for reflected pleasure over this altogether happily conceived incident.

Sir Robert Hadfield is not only the directing head of a steel company with an enviable reputation for business acumen and probity, but he is a scientist whose

work has profoundly affected all the economic uses of steel. Manganese steel, low hysteresis steel for electrical uses and researches into the nature of sound steel-ingots, are some of the better-known instances of his research work. In his relations with workmen Sir Robert has been in advance of the views of other employers, and Hadfield's was always a good shop to work in.

The technical education of workers in the iron and steel industries has been more than a hobby of Sir Robert, and it is fitting that the most coveted honour in the gift of American technologists should be given to the English engineer who has done probably more than any other living Briton to energise the commerce of iron and steel, and to apply science to steel-making in Britain.

TERMS OF SETTLEMENT OF BRITISH COAL STRIKE.

The British coal-strike, as forecasted, has followed the precedent of 1893 and lasted three months, which appears to be about as long as Britain can go without coal without general breakdown of civilized amenities. The country must have been vastly relieved by the compromise which permits the miners to go back to work, although when the terms of settlement are soberly examined, it will be seen that the social revolution in Britain, while proceeding in a constitutional and peaceful manner, is nevertheless proceeding apace.

The British coal-miner, through the mistaken policies of his chosen leaders, innocently enough on his part no doubt, attempted to bell the cat at the bidding of the International Miners Congress held at Geneva in 1920. This congress definitely agreed upon a policy of enforcing "nationalization" of the coal-mines of the world, and the British leaders undertook to lead the vanguard of attack upon private ownership, expecting, there can be little doubt, to receive the backing of the American and European unions that awarded this dubious honour to the British Miners' Federation. Of course they did not get it, nor did they receive the support in their "direct action" policy from other trades-unions which was definitely asked, and as definitely expected. British labour looked over the precipice to which the miners' leaders had led them, and decided not to jump. The miners themselves have been fearfully misled, and unfair advantage has been taken of their traditional loyalty and tenacity. The very qualities which made the British miner the best of all possible soldiers during the War, and endeared him to all that knew him as a fighting man, except the enemy, caused him to follow the course decided upon by his union leaders, although their aims were nebulous and revolutionary in their very essence. The abstention of many miners from voting at the ballot which shortly preceded the settlement was really an expression of pique because the executive of the Federation did not indicate its own views, or advise the men how they should vote in their own best interest. The men's feeling was that the leaders, having got the union into a bad mess, should get them out; and while the attempt of the leaders to shift responsibility for the strike was resented, nevertheless the miners did not break away from what they felt was faulty guidance. The general abstention of the miners from violence was expected by those who knew them intimately. Another feature which had a good deal to do with prolongation of the strike was the fact that the British miner has had an uninterrupted opportunity to work for seven years and he really did not mind a holiday in the fine weather.

The major significance of the failure of the miners' leaders to enforce their proposal of nationalization of the industry and a national wage pool, is that the Cabinet resisted, and the public supported it against an attempt to force such preferential treatment of a section of workers as would have inflicted definite injury upon the community at large. This preferential treatment was demanded, not as a right, but because the coal-miner thought he could get it. The apathy of the other trades-unions arose from a knowledge that the high cost of coal, associated with the favourable and partial treatment accorded the miner, was killing industry and taking the bread out of the mouths of the other workers. There was also a subconscious jealousy of the comparatively higher remuneration and the shorter hours of labour that the miner has been able to obtain which was aggravated in the other workers by the personal inconvenience of the coal shortage. The miners' leaders have met well-merited defeat of their dangerous policies, and they will probably be made to realise that fact, as on them personally, more than on the miners individually, is the public placing the onus of calling and unnecessarily continuing a strike that never had the slightest justification.

At the same time, examination of the terms of settlement will show that they are merely temporary, being terminable at three months notice; and that they also contain features quite novel to British procedure, inasmuch as they include a subsidy from the government, and a national authority for the division of any profits accruing over and above the standard percentage of profits allowed by existing legislation to the mine owners. That is to say, the settlement approves the principle that capital should not earn more than a specified return, and that anything above that shall go in major portion (in this case to the extent of 83 per cent) to the workers.

The British Government has also been empowered to acquire for the State all the coal deposits in Britain, and to this extent the ownership of the coal-seams is already "nationalised". Now private profits have, by mutual agreement of employers and workers, been confiscated for the benefit of the workers. The fly in the ointment is that the trade outlook does not promise

any profits in the mining of coal in the near future, but surely the miners can claim that they have enforced in Britain several entirely new social laws, and have gained acceptance of some principles affecting private ownership of natural resources and division of the profits accruing from their exploitation that are not yet included in the written or unwritten constitutions of North America?

The whole arrangement is predicated on a continuance of large profits in the coal-mining business, and yet it is very generally agreed that a revival of industry in Britain is only possible through a drastic reduction in the price of coal. The two things are not compatible, and it will be interesting to note how the national coal authority will take care of financial losses in coal-mine operation. In view of these uncertainties of the future it is understandable why the arrangement is terminable at short notice, and why Mr. Lloyd George should call the terms of settlement "a great and promising experiment". The greatness of the experiment is not hidden, but the character of its promise only the future may disclose.

A CARBON-MONOXIDE MASK.

The development of a carbon-monoxide mask is announced from the United States and if this device should prove capable of protecting a wearer against deadly percentages of this insidious gas, it will find many industrial uses, particularly in blast-furnace works, and in connection with various forms of coal-gas distillation. Such a mask will of course be of no value where the atmosphere to be respired, in addition to containing an actively poisonous gas like monoxide, is deficient in oxygen. The possession of a mask protecting men against comparatively small percentages of monoxide would in many cases have enabled men to escape from "after-damp" poisoning after coal-mine explosions, as in some cases the atmosphere that killed the victims of such explosions did not put out the light of oil-lamps. The wave of monoxide-carrying air in many instances, is of short duration, and only a short distance of poisonous air would in these instances have had to be traversed to reach good air. There would seem to be possibilities of a self-rescue apparatus in the carbon-monoxide mask that one may hope will be further developed.

Monoxide, in addition to being a quick and sure poison in percentages exceeding half of one per cent in respired air, is in smaller quantities a cumulative poison, and if men are constantly exposed thereto, deterioration of the blood constituents supervenes and becomes incapable of remedy. Where there is likelihood of the presence of small quantities of escaping monoxide, as around blast furnaces and gas producers, the use of the protective mask now available seem indicated.

GAS MASK FOR CARBON MONOXIDE PERFECTED.

The first public demonstration of the gas mask for protection against carbon monoxide, manufactured by the Mine Safety Appliances Company, Pittsburgh, Pa., and in which is utilized the special mixture called Hopcalite, developed by the U. S. Bureau of Mines and Chemical Warfare Service, U. S. Army, was given the afternoon of May 26th in the special smoke room of the United States Bureau of Mines, Pittsburg, Pa. The U. S. Bureau of Mines, in its research of various types of gas masks, including the carbon monoxide mask, has a very large smoke roof especially adapted for testing purposes and the courtesy of the use of this smoke room was extended for this demonstration. In addition the first public demonstration was also given of the U. S. Bureau of Mines gas mask for city firemen, also containing Hopcalite, for carbon monoxide protection.

In this test two men entered the smoke room which contained 1 per cent carbon monoxide gas in the air. of the atmosphere. The canary bird collapsed in to indicate to the observers the poisonous nature One of the men carried a canary bird into the room 45 seconds, and it was immediately removed to fresh air where it was revived with oxygen.

Tests were also frequently made with the M-S-A Carbon Monoxide Detector to show the observers the strength of the gas. The wearers of the mask remained in the atmosphere for 30 minutes doing vigorous work part of the time, and experienced no ill effects whatever from the poisonous carbon monoxide gas. The gas masks gave perfect protection through the entire period of the test.

The carbon monoxide gas mask is of special interest to iron and steel industries, fire departments, industries using gas producers, illuminating gas plants, coal and metal mines and to all other persons who are apt to encounter carbon monoxide gas in their work.

Carbon monoxide occurs frequently in dangerous quantities around blast furnaces, gas producers, etc., and is a constant hazard because of its poisonous nature. A simple protective device, light in weight, devoid of all complicated mechanisms has long been needed for the protection of men engaged in such work.

While the gas mask used will give protection in higher percentages of carbon monoxide, 1 per cent of carbon monoxide will kill a man in a few minutes time. The percentage found in working places where there is ventilation usually amounts to considerably less than 1 per cent.

One-tenth of one per cent of carbon monoxide, however, will seriously affect a man who is working and therefore breathing hard in about one half hour's time, while two-tenths will affect him seriously in about 10 minutes' time.

The carbon monoxide gas mask is therefore of great importance to the country's industries and it is important to note that a splendid accomplishment of the U. S. Bureau of Mines and Chemical Warfare Service in their work on poisonous gases during the War has been adapted to a most important industrial use.

The Sullivan Mine

Canada's Greatest Zinc-Lead Mine.
Study of the Valuable Property of the Consolidated Mining & Smelting Company, where Millions of Tons of High-grade Ore have been Developed With a Minimum of Publicity.

ALEXANDER GRAY, Montreal.

An opportunity was availed of to visit the Sullivan Mine at Kimberley, British Columbia, to ascertain the historical significance of the announcement made eleven years ago by the Managing Director of the Consolidated Mining & Smelting Company of Canada, to his colleagues of the Board—

> "A lease has been taken upon the Sullivan Mine, near Kimberley. A royalty is paid upon all ore shipments, and the Consolidated Company has undertaken to perform $10,000 worth of development work. The mine is producing about 2,500 tons monthly of ore containing approximately, lead 18 per cent., silver 6.0 ounces per ton."

That modestly-stated fact entailed the risk of an inconsiderable amount upon properties unheard of outside the vicinity of the apostolic Mark Creek. Consolidated directors had no wilful intent to soft-pedal the transaction. They offered not a word in self-defense. About all anyone other than the trail-birds of those mineral-laden mountains knew of the Sullivan was that it was located upon Sullivan Hill, not far from Cranbrook on the Crow's Nest division of the Canadian Pacific Railway, was skirted by Sullivan Creek; that a specialist in townsites had duly incorporated Kimberley—for what reason never has been explained.

Sullivan suggested the "Big Fellow"—that superman—the Boston blacksmith who knocked out Ryan—who possessed the punch. Appropriately, also, in due course, a Tipperary claim was included in the Sullivan areas—perhaps Sullivan was a "fighting Tip"—or maybe a certain Baron who reveres Tipperary had something to do with it. At any rate, there was a Milesian flavor about the Sullivan—and it was in order to have a Galore claim—another named Kathleen—and for a Sweeney subsequently to make sheep's eyes at the properties without realizing he was borrowing trouble.

Sure enough the layout was Irish—and there were "bulls" in it, as events disclosed. Naturally Sullivan subordinated Smith, one of his partners in the staking. Both were eliminated by processes familiar to prospectors who are ahead of their time. When nobody possessed of more money and patience than existed thereabouts in those days could continue flirtations with fortune, it devolved upon the Consolidated Mining & Smelting Company to hesitatingly take the lease and bond on the Sullivan—and to begrudgingly assume the obligation to expend $10,000. That the Consolidated directors and management lived up to their contract, goes without saying. They did 375 feet of new development work in the year ending June 30, 1910—bringing the total development to 4,575 feet. A trifle more than a foot a day was the extent of the confidence displayed in the properties, which in that eventful year yielded:

Tons of Ore	6,704
Ozs. Silver	46,196
Pds. Lead	2,451,758
Value	$110,790

That was not a bad start. To June 1910, therefore, reckoning back to 1894, two years after Sullivan, Smith, and their mate drove in their stakes, the Sullivan Mine had produced 92,110 tons of ore: 781,993 ounces of silver; 38,653,397 lbs of lead—the gross value of the whole being $1,931,226.

Probably that was why the Directors discreetly refrained from recording a plea in justification of their "undertaking to perform $10,000 worth of development work," and to pay a royalty on what was shipped. They could have exculpated themselves by referring to the outputting records of the mine—but Messrs. Matthews, two of the inevitable Oslers, Charles R. Hosmer, F. P. Buck and Managing Director Aldridge—five of whom have lived to appreciate the wisdom of their action—felt it was incumbent upon them to make haste slowly. A minor fraction of over a foot a day exclusive of 534 feet of diamond drilling—was all they could afford to do, in the circumstances. The managing director perfunctorily reported progress at the end of the year, although he did not apologize for having exceeded the speed limit of $10,000 as prescribed. Actually, the management spent $18,774.73 for mining, smelting and general expense on account of the Sullivan; $7,057.51 going toward development. Nor were the lessors faring so badly. They took their royalty of the 6,704 tons of lead-silver ore reported — and they did not demur to it with silver at 51.948 cents and lead bobbing around £13 a-ton. Evidently Consolidated directors were reassured and saw a little light on the situation, for they sanctioned 1,798 feet of further development and 8,798 feet of diamond-driling in 1910-11 — which had something to do with what happened to the output of the Sullivan in that year:

Ore	Tons	34,065
Silver	Ounces	258,376
Lead	Lbs.	14,187,354
Gross Value	$	635,223

Even then the management was not overconfident. Taking the 1910-11 output, general manager R. H. Stewart solemnly wrote that "the loss of the St. Eugene tonnage has been serious, but will be partly overcome by the operation of the Sullivan, in which the mineral-bearing area has not been thoroughly prospected". Apparently it would take more than that year to "thoroughly prospect" the Sullivan section. It will take several years yet to reach that objective. Consequently Consolidated directors indulged in no jubilatings when they briefly made this allusion in 1910-11 to Mr. Stewart's report:

> "During the year the company has acquired a majority of the stock of the Fort Steele Mining and Smelting Company, Ltd., owner of the Sullivan Mine. The lease to the Consolidated Company expired on June 30th., and the Fort Steele Company is now operating the property and shipping ore to Trail. The mine is producing between 2,500 and 3,000 tons of ore

containing approximately, lead 20 per cent, silver, 6.6 ounces."

Concurrently and incidentally the Consolidated directors casually announced the expenditure of $217,613.90 — most of it "in purchasing stock and bonds of the Fort Steele Mining and Smelting Company, and the Sullivan Mining Company, owning the Sullivan Mine at Kimberley".

So, a decade ago, the Consolidated Company wished the Sullivan onto itself — salvaged it, rather — and promptly disinherited the makeshift Fort Steele Smelter Company. Then the Sullivan had contributed 126,175 tons of ore containing 1,040,369 ounces of silver; 52,840,751 lbs. of lead — the gross value of it all being $2,566,449 — zinc being unmentionable. Besides, the Sullivan Mine had 2.87 miles of workings. Consolidated sponsors must have been relieved when they had a clearer title and a better chance of procuring tonnage for the railway and treatment charges for Trail. They hardly gave a thought to the historic fact that the Sullivan was only getting its stride — nineteen years after it was staked, Sullivan having been killed, Smith being ruefully resident somewhere in the southland — and the third party to the staking being lost sight of.

During those strenuously unprofitable years, pioneers operating in that sector had invoked the benedictions of the saints by creating a Maryville — where the Fort Steele Smelter was — a St. Eugene; St. Mark, St. John and St. Matthew Creeks — not forgetting the resort to astrology by incorporating the North and Center Star. Devotees at those shrines in this manner strove to propitiate the saints. However, it takes more than fervency to make mines and money out of them. Excepting the Sullivan, the "good" things around Kimberley "died young". Across the creek dedicated to Mark, a streak of rusted rails attests that there was a tramway to North Star Mine. Near by Donald Mann cavorted with the fickle jade. Undoubtedly the district was completely canonized by pioneers. Somehow the wires got crossed. What interest was displayed by outsiders resulted adversely to Smith, who discovered that a vendor consideration paid in assessable shares was a liability he could not meet.

Never was it disputed that the Sullivan Mine was an outstanding feature. It induced the Turner, of Spokane, following to incorporate a company — the Fort Steele Mining and Smelting Company — to operate at Maryville. Charles Sweeney, and his associates, profaned or praised the saintly situation. They came to understand that while Sullivan ores were appraised in public for their silver and lead contents, recoveries were relatively ruinous. It is not material, now, that 150,000 tons of ore carrying 35 per cent lead and running well in silver, was taken from the uppermost workings of the mine. Percentages were running against complex ores in those days — and are yet for that matter, in most instances — "glory holeing", "gophering", getting after the "high spots" — and defective treatment — eventually brought the Sullivan into the lap of the Consolidated Mining and Smelting Company, where it is likely to remain. Electrochemical metallurgical processes — minerals separation by oil flotation — efficient concentration — were not far enough along to extract contained metals without discouraging losses.

Zinc-lead sulphide ores always have met with extreme penalties. Zinc in the estimation of metallurgists pertain to Gehenna and as such is as welcome to them as was "Old Nick" to German chemists when they encountered nickel. Turner and Sweeney with the Maryville smelter and Sullivan complex ores were as unhappy as were the Nichols people and Col. R. M. Thompson when they struck the nickel snag in the Sudbury nickel-copper orees — from which they could not recover clean copper. Zinc was the Nemesis of metallurgists. Hand-to-mouth miners succumbed under the burden of fines and low recoveries. The more experienced, where there was zinc to contend with, urbanely remarked: "Après vous, Alphonse", to those who fancied such complicated ores.

The average of Sullivan ores, excepting where lead predominates, always has had just sufficient silver to warrant its recovery by modern practice. Turner and Sweeney had to confess themselves disconcerted — Sullivan mineralogy was as perplexing to them as nickel was to expert copper-refiners — consequently, the only thing to do was to forego the saints and see if the Guggenheim technical staff would not take over the Sullivan Mine and its appurtenances. But Turner and Sweeney might have known that gift-bearing Greeks are given the third degree by Guggenheim scientists. Upon investigation the Guggenheims, though greatly appreciating the privilege accorded to them — and the generosity of the proponents — were unimpressed. Something of the simplicissimus kind was preferable to the representatives of the metal-market masters.

Here we have a glimpse of the psychic moment, after the 1907 financial upset, when the Consol' Company needed ore, had a more or less inefficient plant at Trail, and the Canadian Pacific would make more freight business. The St. Eugene was petering out. It is customary to rail at the Canadian Pacific now-a-days for sponsoring the Sullivan and the Consolidated Mining and Smelting Company — somewhat to the exclusion of smaller producers. To a certainty the Sullivan Mine, if pressed, is capable of exceeding existing metal-markets. The effect is obvious — but without the Sullivan the incentive to enlarge and perfect the Trail metallurgical works would be less in evidence.

Admittedly, until recently, Trail metallurgy was deficient. Between unsatisfactory recoveries, freights, and treatment charges, as well as the vagaries of metal markets — Trail all these years has had troubles it could not disclose to a policeman. In the beginning, really the Sullivan was a doubtful risk. When the mine was taken over, Manager Stewart thought it had not been "prospected", although it had produced metals to the gross value of $2,566,449. Five years later the Consolidated annual report contained these items:

	Year 1915-16	1894 to Date
Sullivan, Lead Ore	60,266 tons	
Sullivan, Zinc-Lead Ore	30,863 tons	355,537 tons

Having practically trebled the tonnage mined, the primary five-year period of Consolidated control probably increased in corresponding ratio the Sullivan credit. From $42,646,025 the Trail plant production in 1916 had mounted to $81,294,627 — to which advance the Sullivan handsomely contributed. Meanwhile, of course, the Rossland section was re-awakening; copper was in urgent demand. The necessity which knows no law and disdains scientific preconceits led to capital expenditure, research, electrolytic prac-

tice, the adoption of oil-flotation and improved concentration. That was how the Sullivan properties had to be developed and directed toward their true if troublesome destiny. Leaving out the Sullivan, and notwithstanding the revival in precious-metal mines at Rossland, where the War Eagle is yielding excellent results, the Consolidated plans for Trail works would not be so ambitious.

Once the Sullivan asserted its magnitude, the exigencies of the Great War, and urgings from Downing Street, impelled the Consolidated directors to enter upon a capital outlay which makes humorous the $10,000 risked upon the Sullivan. After deducting $278,386 for the year 1915-16, the Consolidated balance sheet showed a net increase on plant account, of $2,047,634. Improvements and extensions were made to the lead-smelter, the laboratory and the assay offices; additions were built to the mechanical department; the lead-sampling mill, crushing-plant with conveyor bins, etc; also a tube-mill for fine grinding, were provided. Details of extensions need not be elaborated. War metals were wanted. Sullivan ores were ready; their metallurgy — bothersome metallurgy — was improving. It is not denied that Trail metallurgy in this respect called for what it obtained — concentration, flotation — and the "White Coal".

On October 12, 1915, work began on the new zinc plant — which now covers an area of about nearly 200,000 square feet — notwithstanding the fears expressed as to the effect of the exhaustion of the St. Eugene. Another new departure was the sulphuric-acid plant, with lead chambers, much of the pyrite coming from the Sullivan. A hydrofluosilicic acid plant accompanied this construction. But it had to be acknowledged that —

> "The process for the production of electrolytic zinc from Sullivan and other ores has been developed under the difficulties of new plant, new process, and limited time".

Concededly, after twenty-four years had elapsed, the Consolidated Company continued to struggle with vital economies, while the copper refinery was approaching fruition, without having sufficient copper ore within the control of the company, or easily accessible. Those paroxysmal years have been misunderstood by outsiders. Not until the Fall of 1918 could the supporters of the Consolidated assert the Trail works "are now working satisfactorily and can be extended indefinitely, producing zinc of great purity. The process will be eventually reduced to a cost lower than the furnace process."

"Eventually" meant that Sullivan ores were busying the staff. Construction work had not ended. To the contrary, the zinc plant was aptly described by Mr. Warren as "the original". Electrolytic-zinc production hardly had begun in March, 1916, when the Imperial Munitions Board placed further contracts for zinc, and large additions had to be made. A great deal had been accomplished. Director Warren, though, impliedly conveyed his hope for betterments when he wrote: "Doubtless improvements in methods will be made as the operations proceed". Sullivan Mine ore in 1916 accounted for all or most of the 3,088,199 lbs. of zinc — and not a little of the 39,974,411 lbs. of lead. That was the initial zinc production — at least in quantity and purity. Blister and refined copper, acids, manganese dioxide, were forthcoming — and metallurgical manager Hamilton went further than Mr. Warren by asserting of Trail:

> "The plant now places Canada in a position to declare her independence of the world for her supply of lead, copper and zinc, all of the highest commercial purity."

To meet that horoscopic view, the Sullivan Mine was placed in the forefront. Of it, manager of mines, Archibald, in 1916 said:

> "The new lower tunnel was advanced. Development work was carried on at the old tunnel level and on the level below. Ore reserves of high-grade lead have not been maintained, but some promising zinc stopes have been opened up and considerable tonnages of low-grade lead-zinc ore developed. Additional development work is being carried on to increase the reserves of high-grade lead."

Mr. Archibald has a reputation for not over-stating. The Sullivan Mine is too comprehensive for other than measured judgment. At that writing there was a total development of 6.26 miles and in the nature of things, with varying values and widths, he was properly conservative. In point of development expense, though, the Sullivan remained secondary to the Le Roi and the Center Star. Mr. Warren was more affirmative than Mr. Archibald; for he informed the Board that:—

> "The completion of the copper refinery marks an epoch in the metallurgical history of Canada. During the War both refined copper and zinc are readily saleable for munitions purposes; after it is over, there is no reason why the entire output of these metals should not be absorbed by the Canadian metal-trades and fabricated by Canadian workmen—a condition possible only because these metals will then be available in a refined state."

Heroic and hopeful as that utterance was, commendable as Consolidated Mining & Smelting Company achievements have been, the wartime remarks of the manager director as quoted, contrast with this paragraph in his latest report of March 1921:

> "While the developments in the mines are very satisfactory, the plants and equipment in a high state of efficiency—and the improvements in metallurgical practice many—and most important—the sudden and precipitous fall in metal — prices which took place in the early Fall and continued over the end of the year has had a very serious effect on profits."

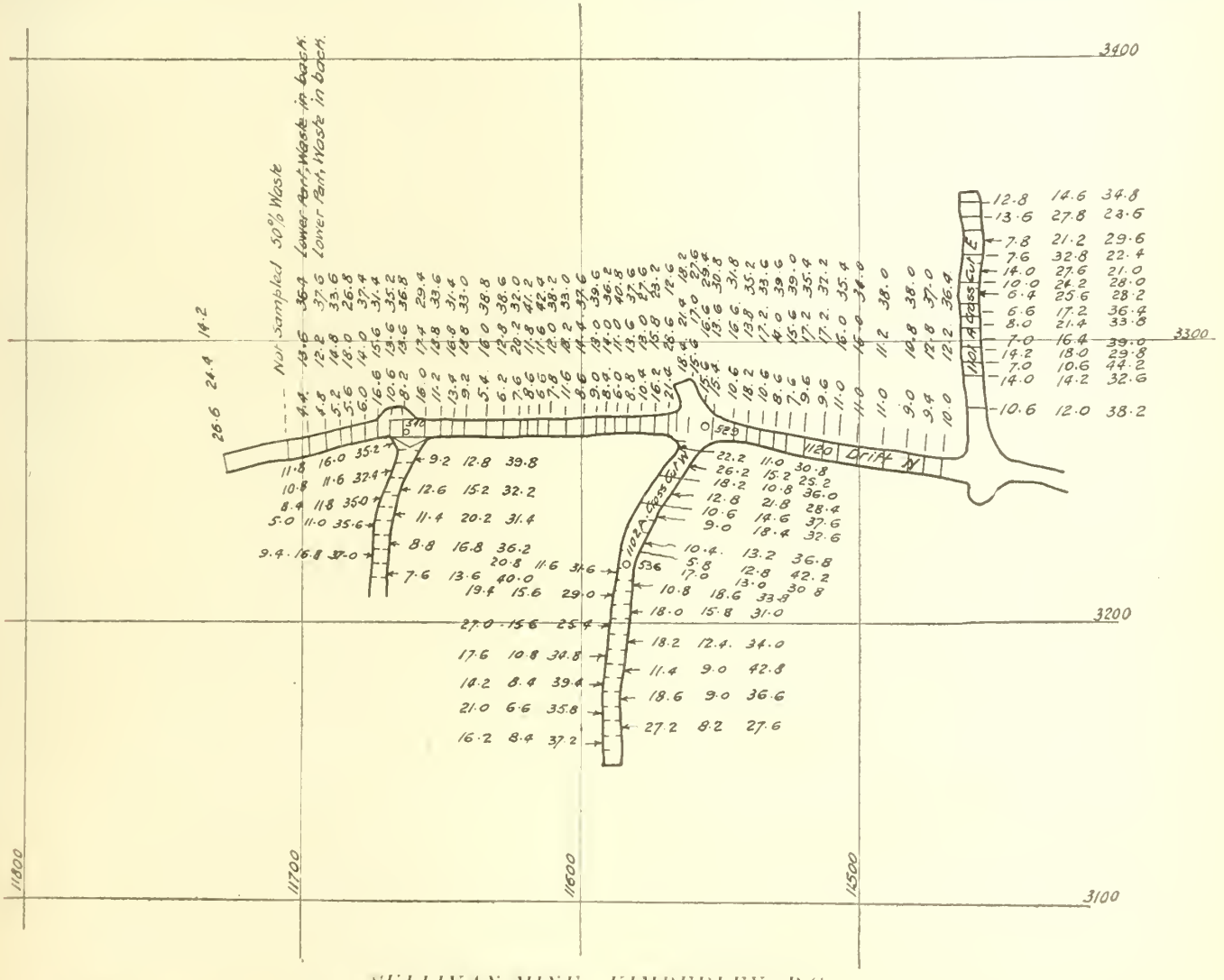
Trail shared the universal experience, plus the tribulations of special-metal producers, who had to contend with minimum demand and urgent competition, inventories and what not. The experience acquired in adversity will be beneficial when Sullivan zinc and lead in assured quantities have to command markets. Wealth stored in Sullivan ores is for circulation—not for cold storage. In December last 5,000,000 lbs of refined zinc was produced at Trail without increasing the working force. What the Sullivan Mine is disclosing was in part outlined by Mr. Warren, who said:

> "In addition to the favorable developments in the mines during 1920, since the beginning of the New Year, further important discoveries have been made in the Sullivan Mine; an extension of the workings on the 11th level has en-

countered a large orebody carrying high-grade zinc and fair lead values; but what is most significant is that diamond drilling on the bottom level of the mine has cut the high-grade lead orebody which was so profitable in the upper levels. This downward extension was located 8,700 feet from the portal of the lower tunnel."

An assay plan of the 11th level extension—where the orebody furnished a very agreeable surprise beyond a diorite or gabbro intrusive dyke—makes cheerful reading. Seemingly the orebody swung more to the north at this point. After drifting on the vein, it was crosscut, and I submit a section which the management courteously permitted me to have for the information of those who are unfamiliar with underground conditions at this extraordinary mine. In combined metals and magnitude this will bear comparison with other great mines of the kind—and with the unique Creighton Mine at Copper Cliff. Confirmation of this development on the lower level fifteen hundred feet on the incline below the upper level upon which it is being blocked out, would give the Sullivan a still larger place and enable the Consolidated Company to meet markets which might be disconcerting otherwise. Basic ores in widths necessitating pillars—and the low angle of dip of the orebody—22 degrees—are causing the management to devise ways and means whereby mucking will be done most economically. Mechanical muckers are useful. At present a drag arrangement is being tested. It takes the broken ore from the working-faces, drags it to chutes, appears to be an effective solution of the mucking problem, and a saving in handling cost that may assume importance in the disposal of a large tonnage. Every economy put into effect makes possible the utilization of lower-grade ore when the Sullivan has its own concentrator on the site selected on the premises.

With the funds and plant available Sullivan operations are all that can be reasonably expected. Whatever of banter, or jollity has entered into this review of a unique mine and its antecedents, my visit to the properties, access to the assay plans and first-hand knowledge of what has been and is happening, leaves little to conjecture. Trail metallurgy, through scientific persistence, is recording about 65 per cent. zinc product and around seventy per cent. of a lead product with a good grade of ore and the small silver content give the Consolidated a "Consolidated" status. At the moment nearly 800 tons is the daily shipment. The mine provides the heaviest traffic of the section to the Canadian Pacific. Last year it supplied 242,294 tons of zinc-lead ore, 13,214 tons of lead and 4,306 tons of



SULLIVAN MINE, KIMBERLEY, B.C.

Assay Plan showing 1120 *ft. Drift North. Figures indicate lead, zinc and iron percentages in order given. Analyses were made from average sample across face every* 5 *ft. in the drift and along the crosscut on alternate sides.*

pyrite—a grand total of 259,814 tons, as compared with 60,266 tons of lead ore and 30,863 tons of zinc-lead ore—a total of 91,129 tons in 1916. Better than a seventy per cent. product from one thousand tons per day—and more if the market requires it—will bring more than encomiums to those who are entitled to the credit for having sustained the managing director and general manager S. C. Blaylock throughout years of unremitting effort.

The relationship of the Sullivan in the matter of the total treated at Trail in 1920 is shown in the figures as given and the aggregate receipts of 592,763 tons. This comparison applies to the ores from every source treated at Trail. As affecting the Sullivan status, it needs only to be urged that 67,838 tons of that ore came from the other various properties of the Consolidated company. And that was a year of miscalculations—of depressed metal workers and high costs of freight and coal. In reality, as Mr. Warren has pointed out, the cost of producing zinc in 1920 was reduced by 40 per cent.—in which result the mining and metallurgical departments divided the honors. Flotation and concentration, hydrolytic accessories, enabled the Trail plant to handle 900 tons per day of Sullivan ore—and we have the acknowledgement of the management that "results were very much ahead of anything thought possible last year, and with the certainty of still further improvement." To the end of 1920, the Sullivan had produced 1,032,359 tons—and the mine had about nine miles of underground development.

Considering everything, the metallurgical unpreparedness, antiquity of a great deal of the surface equipment, extent of the wartime development, expansion of the mine, slump in metals and attempts of the O.B.U. to dictate to the management, it is astonishing to have the degree of efficiency in evidence. The strictest economy—not always the wisest policy where such a mine should have the most modern equipment—has been observed. Mining and tramming costs, the ore being hauled to tipples by electric motors and aerial gear, are about all that could be expected until outputting is increased. Little timbering is required, for the quartzite walls are strong and no difficulty is looked for in having the country rock stand up.

It would be interesting—and it is something the directors might think about—to have the mine and its environs carefully geologized in view of the extensions noted and changes in the character of the ore from time to time. Undoubtedly the directors have had other things in mind, but the Sullivan is one of those realities which warrant action and optimism.

The limit of the available power facilities has been reached. As an exhibit some of the machinery is informative. Pelton wheels when the weather permits, and costly coal in winter, a collection of compressors, the evidences everywhere at surface of enforced economy—excepting in the food supplied to the men at reasonable cost—form a chapter in the history of this remarkable mine.

Since the Sullivan has become one of the greatest factors in the zinc-lead markets of the world, capital expenditure upon a concentrator on the spot, the provision of all-the-year around electric power, and on plant and dwellings, is imperative in order to effect savings and promote social conditions during larger operations. Sites for the concentrator, offices and more surface works await construction. A new townsite and a number of residences are ready. Places for fraternizings and amusement are lacking, although *esprit de corps* exists throughout. Supt. Montgomery being in close touch with his staff and his men. Sullivan equipment has served its purpose. The mine and its mission have outgrown it.

Of this aspect of things, however, it is to be said that it is flattering to the board and the management that they gave precedence to the mine and the metallurgy of its ores. The upper workings at the 1,000 and 1,100-ft levels are being drawn on. The area above the 1,000-ft level is about exhausted. At 1,100 elevation an upper tunnel has been driven into Sullivan Hill for a distance of over two miles—and only two faults have been noted. Neither has had adverse effect upon the ore-body, which has been proved for about 3,300 feet in lateral extent, of varying grade and width, carrying an average of about 2 ounces of silver, and offering a zinc and lead content which the management endeavours to maintain at a shipping average of 10 per cent. lead and 18 per cent. zinc. This, of course, excludes second class ore. To make the grade some sorting is done. Where there is so much ore it is easy to ship almost any average desired. For example, a recent train of cars, the ore in which came from both the upper and lower tunnel levels, went 2.6 ozs. silver, 10.6 of lead and 18.2 zinc. It is not claimed the ore carries more than about 2 ounces of silver. Here and there, where there is a larger lead-content, the silver values are higher, but those enrichments are localized. However, the management wants more of them and expects more of them, as indicated by the statement of Mr. Warren that the high-grade lead recovered from the uppermost workings had been cut by a diamond drill at a depth considerably below the lower tunnel where there is ore 1,500 feet on the incline from what is designated as the upper tunnel.

It was in this upper tunnel, too, and at the north end, beyond a diorite or gabbro dyke, that the mine furnished a gratifying surprise. Close check is kept wherever lead predominates, for the grade improves. On what is called the sill of the Montreal stope, there is a recurrence of this richer lead and higher silver. This, and the disclosure in the diamond-drill hole, removed the necessity for conjecture as to what the ore-section proved and represents in tonnage and dollars and cents.

The Sullivan Mine has so many millions in its lead and zinc that optimistic estimates would be hazardous. To a certainty, the two tunnels, crossents, raises, stopes and exploratory drill-holes, have removed doubt—if doubt existed—regarding the tonnage in a block of first-class ore, say 1,500 ft. by 2,000 ft. by 6 ft. Conservatism does not belittle the Sullivan. There are stopes as big as those at the Creighton nickel-mine—and those are big enough for the most exacting. Clambering through several of those stopes with the quietly enthusiastic Superintendent, with their sections from 100 to 150 ft. wide and massive ore, similar in this respect to the Creighton, leaves no room for doubt as to Sullivan certainties. Not all of the tunnel-level ore-sections are in shipping ore, by any means. The mineralization in the nature of such occurrence varies. Every test thus far applied reveals exceptional quality and tonnage. I quote the results of two exploratory drill holes put up from a long raise from the lower to the upper tunnel, each hole cutting a section 40 ft. in width:

Percent Lead.	Zinc.	Percent Lead.	Zinc.
23.1	18.1	13.6	14.6
7.8	15.3	6.8	13.0
4.5	8.4	10.4	11.4
15.2	3.8	16.0	15.0
16.6	18.7	23.4	12.2
28.2	1.8	11.6	14.2
16.6	0.7	8.0	16.8
15.2	5.7	28.0	5.2

To meet any contingency the Sullivan block of ore between the tunnel levels is to be systematically opened up by raises and intermediate levels, for which latter stations will be cut in long raises. Meanwhile, the interseeting of the ore body a considerable distance to the northeast and a further thousand feet or so on the incline, fortifies the mining position. A glance at a blue-print surface-plan, new red pencillings on claims lately Crown-granted; the location of the drill-hole referred to by Mr. Warren, and of another to tap the ore-body at still greater depth, attest the expanding views of the management. Naturally, therefore, those in charge are chary about venturesome estimates as to the actual or probable ore-reserves. They count on 5,000,000 tons of high-grade or 10,000,000 tons that are equal to any emergency—and those would not be the last words, by any means, if the deep drill-hole does not furnish a disappointment.

For the moment, the management is bent upon keeping the lower tunnel in the footwall, about 4 or 45 feet from the ore-body where it can be tapped by a series of crosscuts and raises and drawn on. Mr. Montgomery rests his case upon the brief statement that he thinks "the biggest part of the Sullivan is below"—and it may be so. Manager of mines Archibald who has a reputation for far-sighted thoroughness, has ventured no projections. A mine that is prepared to supply a thousand tons a day for a good many years, and that has every indication of prolonging that life, is removed from special pleading. Undoubtedly the Sullivan properties—and the ores—have raised difficulties. Those difficulties have been met. Success could not have been attained—so soon at least—were it not for the influential backing of the Canadian Pacific.

How to dispose of Sullivan products when markets are "baffling", as Mr. Warren put it, and competition is keen, brings to the fore the necessity for centralization that will reduce freight charges and bring down mining and power costs. Consolidated directors are indebted to Canadian Pacific chiefs for what has been achieved at Trail, and for what the Sullivan mine is. That is the long and short of it. The Sullivan Mine when equipped could swamp its metal markets—and that is all there is to that—were it the part of wisdom to indiscriminatingly force markets. Stoping widths of 140-150 feet in places, the lateral and vertical continuity of the ore body, the grade established in a large tonnage, and the solution of the metallurgy will compel metal masters to reckon with the Sullivan.

Greatness is inseparable from liabilities. Sullivan metallic fixed quantities are worth the commitments of the Consolidated Mining and Smelting Company-stocks, bonds, special loans and overdrafts—several times over. Since the Sullivan was gingerly taken on in 1910, the liabilities of Consolidated Smelting have nearly trebled—but the asset position is infinitely stronger. In place, proved and indicated, there is anywhere between half-a-million and three quarters of a million tons of lead. Zinc contained in the ore-reserves will almost double that in quantity. So the Sullivan is in a class by itself, and the average Canadian view of Trail doings—which are predicated in no small degree upon Sullivan developments and the solution of the metallurgy of Sullivan ores—has been out of focus. That there is more to do at Kimberley, is obvious. A Board consisting of president Warren, vice-president George Sumner, Sir Edmund Osler, Charles R. Hosmer, H. S. Osler, W. L. Mathews, J. G. Hodgson, Henry Joseph and J. K. L. Ross, and the management, will not deny to the Sullivan all it requires. Last year, Consolidated Mining and Smelting showed its appreciation of the broadening situation by making these expenditures:

Advance to West Kootenay Power & Light Co., for Extension of Power lines ..	$698,000.00
Construction, Rossland Ore Concentrator, being used for treatment of Sullivan ore	269,561.14
Enlargement of Copper Refinery	208,912.09
Construction of Rod Mill	127,440.28
Construction, Copper Anode Refining Furnace	29,229.94
Construction, 3 additional Dwight & Lloyd Sintering Machines	158,760.56
Kimberley Housing	59,941.63
Additional Zinc Smelting Furnace	21,802.46
Thaw House	33,631.26
Advances & Expenditures, Account Sunloch Copper Mines, Ltd	72,963.27
Advances to Coast Copper Company, Ltd	130,704.03
	$1,802,066.66

The Trail works now can deal with raw ores to the refining of the metals—and provide finished products.

PERSONALS.

Mr. J. P. Bickell, president of McIntyre Porcupine Mines, has returned to Toronto after visiting the company's coal mine in Alberta, which is now operating successfully. The McIntyre and Temiskaming companies are jointly interested in the coal mining enterprise.

Hon. E. N. Rhodes, president and general manager of British America Nickel Corporation, announces that he will retire from public life upon dissolution of the present Parliament. Mr. Rhodes is Speaker of the Canadian House of Commons. He recently took up the task of supervising the reorganization of the nickel company's affairs.

Mr. A. G. Burrows, of the Ontario Department of Mines, has returned to Toronto after examining a gold discovery recently made at Gondrean, Ont.

Mr. P. E. Hopkins has returned to Northern Ontario gold districts on field work for the Department of Mines.

Mr. E. P. Mathewson has returned to New York after spending several weeks in England and on the Continent.

Hon. Harry Mills, Minister of Mines, has returned to Toronto after a visit to Northern Ontario mining districts.

Mr. Peter Kirkgaarde is at South Porcupine in connection with the development of the properties of Allied Gold Mines.

Mr. R. W. Brock, who was recently visiting in Ontario and Eastern States, is now on his way to England, having made a trip back to British Columbia to get his family.

The Search for Oil in the Pasquia Hills

A Preliminary Report by Dr. R. C. WALLACE, Commissioner for Northern Manitoba.

Topography.

The Pasquia Hills form a part of that escarpment of Cretaceous shales resting on Palaeozic limestones which is generally known as the Manitoba escarpment. In Manitoba the escarpment is represented by the Pombina Hills, The Riding, Duck and Porcupine Mountains, while in Saskatchewan the escarpment continues as the Pasquia Hills and Wapawokka Hills. The elevation of The Pan, at the base of the hills and over forty miles distant from the nearest scarp is 880 feet. The elevation of the summit has not been accurately determined, but is less than 2500 feet above the sea level. The general direction of the hills is determined by the Carrot river which flows in a northeasterly direction into the Saskatchewan river, and has dissected a wide valley in the western plains. Between this valley and the valley of the Red Deer river at the south side of the hills, carved by that river on its eastern course to Lake Winnipegosis, there has been left a triangular block of shales forming the Pasquia Hills, the base resting against the Red Deer river to the south, and the acute-angled vortex elongated toward the northeast along the Carrot river valley. This northeast corner of the hills is being somewhat rapidly eroded by the headwaters of the Pasquia river, which almost parallels the Carrot river in its northeasterly course to the Saskatchewan river, which it enters at the forks where stands the Town of The Pas.

Geology.

The general geological features were worked out by McInnes in 1907, and correlated with the work done by Tyrrell on the Porcupine, Duck and Riding Mountains. The hills are made up entirely of Cretaceous shales resting on a base of sandstone, the whole in turn lying on the Palaeozic limestones. The general section of the Cretaceous is as follows from top to bottom:

(4) Pierre Shales
(3) Niobrara Shales
(2) Benton Shales
(1) Dakota Sandstone

(1) Dakota sandstone is soft, friable, gritty and usually carries saltwater. In our recent investigations the Dakota sandstone at the rapids on the Carrot river, 10 miles above Red Earth Indian Reserve gave the following section, from top to bottom:

(c) Coarse grit with small pieces lignite	2½ ft.	
(b) Soft sand, ferruginous and diagonally bedded	10	ft.
(a) Hard sandstone with Calcareous cement	3	ft. exposed
	15½	ft.

There is no doubt that this does not represent the total thickness of the Dakota sandstone in this area. No data was obtained, however, to give a satisfactory estimate of thickness. Elsewhere in Manitoba the thickness of this formation is very variable, ranging from 19 to 200 feet.

The importance of this sandstone in the present connection lies in the fact that what oil might be collected from the overlying bituminous shale would collect and be held in the Dakota sandstone. The indications and structures in this sandstone are therefore significant of the presence or absence of oil.

Benton Shales.

(2) Normally the Benton shales are dark, soft, readily breaking down into clay, and not apt to show good exposures. In the present investigation the lowest outcrops on the Man river, at the log jam (elevation 1225 feet) and the lowest scarps on the Pasquia river south of Mountain cabin (elevation 1185 feet) are attributed to the Benton formation. In both cases the shales carry no fossils, are apparently only slightly bituminous, and disintegrate readily. As the elevation of the upper exposures of the Dakota sandstone at the Carrot river rapids of 1070 feet, the Benton shales cannot exceed 115 feet in thickness, and may be much less. Elsewhere this horizon has been found to be 178 feet thick.

Niobrara Shales.

(3) The Niobrara shales are the important oil-bearing shales both in the Pasquia Hills and elsewhere in the Manitoba escarpment. They are light grey, carry numerous fossils, are highly calcareous, fairly hard, and contain in the section on the Man river a bed of limestone 8 in.-10 in. thich, which serves as an excellent marker throughout the exposures. The section taken as Niobrara in our investigations on the Man river is as follows from top to bottom:

100 feet	fissile oilbearing shales characterised by occasional bands of yellowish bentonite
8 inches	limestone, highly fossiliferous
18 feet	fairly hard shale, bluish grey, with four bands of bentonite the lowest 5 in. thick
40 feet	very light grey shale, breaking into small pieces
159 feet	

On the Pasquia river the base of the Niobrara shales is taken to the top of the second scarp above the log chute, or 35 feet above the river bottom at the log chute. The section is obtained, though imperfectly, on the sharp ascent on the north and south timber line immediately south of the hill on which the log chute was made. The highest elevation reached on this hill was 1385 feet, while the elevation of what is considered to be the top beds of the Niobrara on the Man river is 1390 feet.

The total thickness of the Niobrara shales in the Pasquia Hills may therefore be taken as 150-175 feet approximately. Elsewhere they have been found to vary in thickness from 130 to 250 feet or possibly considerably more.

Pierre Shales.

(4) Overlying the Niobrara shales, and probably extending to the summit of the Pasquia Hills, are found the Pierre shales, which are dark, soft, with a tendency to break into rectangular blocks, the joint planes often showing a rusty surface. They contain nodules of clay ironstone, apparently in bands, and commonly carry small crystals of the transparent variety of gypsum solinite. From the point of view of the present investigations they are not of importance, as they are not as a rule bituminous. A very good section of the Pierre shales is exposed on the Man river giving a total scarp

of 110 feet, the lower 35 feet of which is partially covered by slides, but the upper 75 feet is exposed in a vertical section.

Economic Possibilities.

The fact that the Niobrara shales are in part bituminous has led to the leasing of certain areas on the hills with the intention of drilling for oil pools. Activity has been confined mainly to the scarps on the Cracking river, Man river, headwaters of Pasquia river, and on the plain at the foot of the hills in the vicinity of Turnberry. The shales and the possibilities of oil reservoirs will be considered independently.

(a) **Distillation of bituminous shales.**—Samples of the shales of the various horizons of the Niobrara and of the top of the Benton were taken for analysis in order to determine which horizon carries most hydrocarbon. From rough tests in the field it would appear that the beds immediately below the hard limestone-ledge, as they appear down the Man river from the point where the Fir River Cabin trail crosses the river, carry the highest value. The results of the analysis, which are not yet to hand, will settle this point. There has previously been an official analysis made of a sample which was taken by McInnes for the Department of Mines at Ottawa. This analysis was

Crude oil 7.00 Imp. Gal. per ton.
Sulphate of Ammonia 22.5 lbs per ton.

The sample was taken from the shales underlying the limestone bed on the Man river, and from the scarp which would in all probability have lost some of the bituminous contents to be found, for instance, in drilling through the same horizon some distance back from the exposure. As is well known, the oil shale distillation industry has thriven in Scotland for many years, the average content of the shales being 16-35 gallons per ton, and of the ammonium sulphate 30-75 lbs per ton. The shales are mined in Scotland from considerable depth, thereby adding much to the cost of mining above what would be necessary in surface operations such as are possible in the Pasquia Hills.

The question of distillation of oil shales has become an important one on this continent in recent years, owing to the ever increasing price of gasoline, and the how well known oil shale resources of Utah and Colorado. Many plants have been erected in the Western States, some after the Scottish practice, but mainly with retorts built to suit the new conditions. Owing to the fact that, for some years at least, the market for ammonium-sulphate will be limited on this continent, while it commands a good price as a fertiliser in the British Isles, it is necessary to build up the industry on shales with a considerably higher oil content than is mined in Scotland. Eventually there will be a large market for ammonium-sulphate fertiliser, when the soils of the western plains reach exhaustion.

The day of the oil-shale distillation industry on this continent is being hastened by the fact that demand now exceeds the production from the present oil fields. It will probably be necessary to be assured of considerable sections of oil shale with an average content of at least 40 gallons to the ton, exposed under conditions which will admit of steam-shovel methods of excavating before it will be advisable to consider operations. When the industry is established on a commercial basis in the Western States, the most successful methods of operation there will serve as a guide in the Canadian field.

In case the Niobrara horizon already described prove to contain a sufficiently deep section of shales averaging 40 gallons to the ton, the section on the Man river at the crossing of the Fir River Cabin trail, that on the Pasquia river above the log chute, and, perhaps even better placed for transportation, a section on the headquarters of the Papikwan river, would be well worth holding for future operations.

Dr. S. C. Ellis of the Geological Survey will carry out a full investigation on the shales during the summer.

(b) Oil Reservoirs.—The main interest is centred in the chances of obtaining oil by drilling. Some staking took place at the base of the hills on the eastern side last year, and very considerable staking has taken place on the hills this year. While a possibility of the presence of oil pools cannot be excluded in any formation where the rocks contain oil, as in the Pasquia Hills, the evidences on the field would indicate that such a possibility is somewhat remote in the Pasquia Hills district. The reasons for this conclusion are the following:

The carrying rock for oil expressed from the Niobrara shale would be the Dakota sandstone at the base of the shales. There are no beds of sand in the shales of sufficient thickness to act as accumulators of oil. In the vicinity of the hills the Dakota sandstone is exposed at the Carrot river rapids, and on the Red Deer river. Further afield the same sandstone is seen at Wapawekka hills, on Swan river, and at Kettle hill at the south end of Swan Lake. While there are thin beds of lignite in this sandstone, nowhere is there evidence of bituminous material, as would undoubtedly be found if the sandstone contained oil reservoirs.

The hills form an isolated eminence sharply cut off on every side except the southwest. The distance to an outcrop of any shale horizon is very short, and any oil that may have been expressed has had an unobstructed path horizontally to an outlet at some scarp. For this reason better opportunities for oil should occur south-westwards towards the western boundary of Saskatchewan, particularly where the Dakota sandstone, which is 1045 feet above the sea level in the Carrot river, reaches with its southwesterly dip an elevation of say 500 feet or less above sea level:

There are minor foldings both in the Dakota sandstone at the rapids and in the Niograra shale on the Man river. No major folds have yet been determined such as would be of significance for retaining oil. The exposure at the rapids is too limited to determine whether the local flexing of the sandstone represents part of a major anticline in the Dakota sandstone with a northwest and southwest trend.

The oil shales of the Niobrara series and the underlying formations have been drilled at Neepawa, Riding Mountain, Vermillion River, Deloraine, Manitou, Snowflake and Rathwell without oil being obtained, and drilling is now being carried on near Mafeking on the Porcupine Mountains. The underlying Devonian limestone in which remarkably perfect domes are found in the exposures on the west side of Lake Winnipegosis, is now being tested by the Provincial Government by drilling on one of the most pronounced domes yet mapped, southeast of the village of Winnipegosis.

A final test can however be made only with the drill. A Star drill outfit is now at The Pas, which will be shipped to the Man river to drill the shales in that district. Apart from testing the possibilities of all pools, the drill record will be of value in determining the oil contents of the shales of the difference horizons from

specimens which have not by any chance been affected by weathering, as have all the shales from the river scarps. It will also establish thickness of horizons as a guide to future exploration in a much more satisfactory way than from surface exposures. It would seem advisable to establish the drill hoe some two miles east of the already described scarps on the Man river, on the jackpine ridge at an elevation above sea level of not less than 1500 feet, if a suitable point with this elevation can be satisfactorily established.

Agricultural Lands.

While not directly connected with the matter of this report, the agricultural value of the lands on the slopes of the Pasquia Hills are of such importance as to demand notice. The writer had previously been aware of the importance of the bottom lands of the Carrot river valley and the so called triangle, all of which will afford soil which can hardly be excelled in the West when a reclamation scheme is completed. On the higher lands of the Pasquia Hills, however, at an elevation 200-500 feet above the valley of the river, and probably to considerably greater elevations, there is land, now fairly heavily timbered with spruce, jackpine, and poplar, which will soon maintain agricultural communities of great importance. Tradition has it that the timber on the hills is of recent growth. To the Indians they are the "Pasquia" or Prairie Hills; and the character of the country would seem to bear this out. The Canadian National Railway line from Melford northeastwards will presumably cross the Carrot river at or above the rapids and skirt the northern slopes of the Pasquia Hills in order to connect with The Pas. Agricultural settlers will immediately press in on the heels of the railway over the whole of the Pasquia Hills section, with great advantage to this wonderfully fertile section of Northeastern Saskatchewan and to the Town of The Pas as well.

PEAT DEPOSITS OF PORT ARTHUR DISTRICT TO BE INVESTIGATED.

J. J. O'Connor, Port Arthur.

The peat resources of the Port Arthur district are about to be investigated by the Geological Survey, under the direction of Mr. A. Anrep, who is now on the ground.

The party will go into camp at Roslyn, on the outskirts of Fort William, and will direct their operations covering the extensive peat beds in this vicinity, from that point.

Mr. Anrep is a son of the famous Dr. A. Anrep, a Swedish scientist and inventor, of Stockholm, Sweden, whom the Russian government induced to remove to Moscow, in 1880, for the purpose of research work in peat fuel, and the application of the scientific methods in use by him, on the immense peat resources of Russia.

In 1883, his inventions solely controlled the peat industries of that country. In 1910, something over four million tons of peat was produced through his machines. The product is in the form of bricks, air and sun dried, but without briquetting.

Mr. A. Anrep, in charge of this party, was born in Moscow, and followed in the footsteps of his father, devoting all his active business life to the scientific production of peat fuel. He was invited by the Dominion Government to come to Canada fourteen years ago, and designed the first scientific peat-plant in Canada, at Alfred, Ontario, for the Federal Government, in 1908.

This plant was operated jointly by the Federal and Ontario governments, on an experimental basis in 1919-20, during which period between six and eight thousand tons were produced. An improved type of spreading conveyor to be tried out this summer is expected to effect further saving in labor costs. Peat can be manufactured at Alfred, for $4.00 per ton, f.o.b. cars.

The economic importance of a plentiful supply of peat fuel at the Head of the Lakes, cannot be overestimated by residents of this coalless region. If the beds that are to be investigated prove to be of satisfactory composition, the transportation charges will be within figures that will ensure a moderately-cheap domestic fuel.

LE ROI No. 2 TO ADOPT FLOTATION CONCENTRATION.

At the twentieth annual meeting of the Le Roi No. 2 Ltd., held in London on June 23rd, Lord Ernest Hamilton, Chairman of the Company, said the period of fifteen months covered by the financial statement had not been a profitable one. The margin of profit over expenses, never very large, had been wiped out by a general increase in costs of labor and material, and there had been no returns from the smelter for over a third of the period, owing to the Trial Smelter having been closed down. Prospects, however, were more hopeful, as costs were being reduced, and the Manager, Mr. Lay, had advised them from Rossland, that "no reasonable doubt can exist as to the successful application of flotation to our ores." The process would enable re-working of the dumps, which it was estimated, could produce $55,000, more than enough to cover the cost of the flotation plant. The consulting engineers reported that plans had been made for the alteration of the existing mill, and economies had been found possible, first by adoption of the simplest form of the Minerals Separation machine, and secondly by having the plant built in Canada. It was hoped to have the new plant in operation in July. The consulting engineers stated that the amenability of the Rossland ores to treatment by the Minerals Separation plant had been amply demonstrated by the Consolidated Mining and Smelting Company.

DEATH OF W. D. HANNAH.

A well-known figure in the coal trade of eastern Canada has been removed by the death of Mr. W. D. Hannah, who was for many years General Fuel Inspector for the Grand Trunk Railway. Mr. Hannah was born in Scotland and was 77 years old at the time of his death. He was in the service of the Grand Trunk Railway from the time he arrived in Canada as a young married man. Mr. Hannah's genial personality was not allowed to interfere with his native shrewdness in his duties as fuel inspector, and he insisted on a square deal for his road. Mr. Hannah had a wide acquaintance with coal producers in the Maritime Provinces and in the Eastern coalfields of the United States. Although for some years retired from active work, the news of Mr. Hannah's death will be heard with regret among those who remember him as fuel inspector.

Northern Ontario Letter

THE SILVER MINES.

Now that work has settled down into a steady groove, there is a tendency to regard the silver-mining industry of Cobalt with renewed confidence. The leading companies are showing a determination to realize satisfactory net profits and are considering ways and means of still further reducing their operating costs.

Cyril Knight, Ontario Government geologist, is making satisfactory progress in connection with a resurvey of the Cobalt field, and expects to complete the work early during the coming Fall. Mr. Knight expressed the opinion to the "Journal" correspondent that although the richer deposits have probably been discovered, yet in various of the operating mines as well as some of the old properties which have never been extensively worked, there are good prospects of further important developments. Ore-shoots may occur with decreasing frequency, yet there are excellent chances of intelligent effort being well-rewarded, in the opinion of Mr. Knight.

The Mining Corporation is now realizing a profit on its operations. This fact is made clear in the following statement which was made at the company's annual meeting by J. P. Watson, president of the company:—

"Since the first of the year, we have refrained from selling silver in quantities, owing to the continuing low price, and we are carrying about 650,000 ounces. To offset the loss of interest we would otherwise make, we have been selling spot silver in London at a premium over forward purchases of the same quantity which, without any risk to the corporation, enables us to earn interest on the value of the silver sold and a small profit besides.

"As to the condition of our Cobalt properties. In the first place, I am very glad to say that we have been amply justified in the purchase of the Buffalo mine. You will have noted from the annual report that the reserves in the Buffalo alone are estimated at 1,350,060 ounces; and recently we have been fortunate in the discovery of two new veins on this property, which will make a valuable addition to these reserves. In addition to this, we are continually finding on our different properties new stringers or small veins which add to our milling ore, and finding unexpected extensions to existing high-grade veins.

"I would like to point out to you that at the end of 1917 our ore reserves were estimated at 1,545,370 ounces. Since that date, we have produced 4,602,923 ounces and our total reserves at the end of 1920 are estimated at 2,181,000 ounces.

"For some time, we have been aware that certain alterations could be made in our Cobalt Reduction mill which would increase its efficiency and consequently, reduce costs. But, while silver was at its high point, we did not think it advisable to close down for the necessary two or three months to make the alterations. However, this spring, we concluded that the time had come, and our mill was closed from March 7th to May 25th, during which time the alterations were made, increasing our capacity from 180 tons per day to 200 tons. This increase of tonnage, together with improved methods of treatment and lessened cost of labor with its increased efficiency will, we hope, so reduce the cost of production that even the present price of silver will give us a fair net profit.

"Our intention is to go ahead full speed, but in this connection I would ask the shareholders not to be alarmed should we again close down during the coming year, as it will not be done because of any lack of ore but for other reasons, to safeguard the interests of our shareholders, your directors being determined that they will not operate and sell silver at a sacrifice price, nor submit to inefficient labor at an excessive wage.

"The policy of our corporation for years has been the acquisition of new properties to prolong its life as a mining company. By the acquisition of the Buffalo property, we have undoubtedly added both to the value and length of life of your company; but our recent acquisition of a majority interest in a large copper, gold and silver property in Manitoba is the most important step we have taken. A short, conservative description of this property has been given in our engineers's report. Briefly there are 16,000,000 tons of assured ore, and additional possible and probable ore of another 9,000,000 tons in the ore-body on which we have worked. In the property there are 1,303 acres, which have unknown possibilites, but it is in the centre of a well-mineralized country. The values given for the ore in our report are based on assays of the diamond-drill cores; but, in the sinking and driving which took place last year, careful moil-sampling was done, and I am pleased to tell you that the copper contents showed an average of about 32 p.c. in excess of those given in our report; the gold and silver remaining as shown by the drill cores. Many difficulties and problems will be encountered in the development of this ore-body, but the values already proven are so stupendous, and there being no metallurgical difficulties, we are encouraged to hope that we have reached our goal in providing for an indefinite life for the Mining Corporation of Canada."

On July 20, the Nipissing Mining Company will disburse a regular quarterly dividend of 3 p.c. This will call for the distribution of $180,000.

The Kerr Lake dividend of 12½ cents a share, payable July 15, will call for the disbursement of $75,000, and not $225,000 as reported last week.

Arrangements have been completed to commence shaft-sinking on the Oxford-Cobalt property at the point where rich ore was found some weeks ago. A hoist has been set up, and the shaft will be put down to contact, about 60 or 70 feet.

The carload of ore reported in May as having been taken from the Ophir mine, came from the dumps of the Peoples Silver Mines, Messrs. Chitty and Johns having had a lease on the dump.

Fire destroyed surface equipment at the Trethewey property in Gowganda, and the property is now idle. It is understood the directors may make an endeavor to raise additional finances with which to re equip the property as well as erect a small mill.

The annual statements of the Beaver Consolidated Mines, Ltd., and the Kirkland Lake Mining Company, Ltd., have just been issued. That of the Beaver Consolidated covers the fiscal year ending February 28th, while the report on the Kirkland Lake Company covers the fiscal year ended May 31st.

Features of the Beaver Consolidated statement for the year are these:—

Total income	$189,902
Total expenditure	193,520

This shows that without making provisions for de-

preciation, the loss for the period amounted to $3,617. Factors contributing to this loss were the shortage of labor in the first half of the year, a power shortage during the last half of the year, together with a sharp decline in the price of silver.

The Beaver Statement shows a balance to credit of $953,255 an analysis of which shows the balance to be made up largely of money advanced and stock purchased in other companies. It is noted that the Beaver paid $371,519 for the stock of the Kirkland Lake Gold Mining Company, in addition to which the Beaver has advanced $421,881 in cash with which to develop and equip the Kirkland Lake enterprise. This proposition, therefore, represents an investment of $793,401. There is a further important item which is classified as balance to credit, this being $143,250 in the Beaver Auxiliary Mines, a prospect venture which the Beaver entered into several years ago in the Elk Lake district and which has not been worked in recent years.

For the year ended May 31st, the Kirkland Lake Mining Company made a profit of $34,990. This was reduced, however, to a loss of $11,082 by writing off $13,493, for depreciation and providing for interest on notes amounting to $32,580. This loss, added to the deficit as of the beginning of the year, leaves the Kirkland Lake with an adverse balance of $28,958.

Production for the year amounted to $277,007, the mill having treated 45,479 tons of which all but 2,657 tons came from below surface, the latter coming from the surface dump. Features of the Kirkland Lake operation are these:—

Daily tonnage	124
Tons treated	45,479
Value produced	$277,007
Per ton value	$6.09
Cost, less interest	$291,704
Per ton cost	6.41
Loss per ton, about	.32

The company realized $36,106 on exchange. Weighing against this is $32,580 which the company had to provide as interest accrued on notes.

The physical condition of the property is stated to be strong, and the prospects of realizing substantial net profit during the current fiscal year is good.

Ore and Bullion Shipments.

Following is a statement of ore shipments over the T. & N. O. Ry. for the month ending May 31st., in tons of 2,000 lbs.

Cobalt Proper.	Tons.	
1. Coniagas	81.20	
2. LaRose	42.03	
3. O'Brien	133.61	
		256.84

The above shipments were made to the following Companies:

Canada.

Delora Smelting & Refining Co.	Delora	133.61
Coniagas Reduction Co.	Thorold	79.46

United States.

American Smelting and Refining Co.	Perth Amboy	43.77
		256.84

Price of Silver.

Note.

May 7th.	Highest	62.500
May 31st.	Lowest	57.500
	Average	59.810

THE GOLD MINES.

The Porcupine Field.

The turn of the last half of the current year finds the gold mines of Northern Ontario in a strong physical condition and enjoying very satisfactory prosperity. In the increasing tonnage being handled for each man on the pay-rolls of the leading mines lies the secret of the increasing margin of net profit now being realized. In the case of the Hollinger, an average of around 2¼ tons of ore are being handled daily per man, as compared with the low average of under 1½ tons per man when efficiency was at its worst during the past few years.

It is believed that the gold mines of Porcupine and Kirkland Lake from this date forward, will realize an aggregate net profit of over $8,000,000 a year. This may be still further increased within the next year or so. Those in close touch with the mining situation as found in these high-grade goldfields believe the stockholders of the producing companies stand in line to cash in cheques amounting to at least $8,000,000 a year as a reward for their patience during the adverse conditions of the past few years.

The McIntyre-Porcupine, on June 30, closed one of the most favorable fiscal years in its history. It will probably be two months before the annual statement can be prepared, but among other favorable features, a substantial increase in ore reserves is expected to be shown. The company is now in a position to proceed at once with the work of enlarging its plant, with a view to treating about 900 tons of ore daily by the end of the current year.

A promising discovery has been made on surface on the Three Nations property of the Allied Porcupine Mines. P. Kirkegaard, consulting engineer for the company is at the property this week. The surface work now under way is in charge of L. K. Fletcher, and a shear zone has been opened up in which mineralization is encouraging, some favorable assays having been taken.

Kirkland Lake and Boston Creek.

The annual statement of the Kirkland Lake Mining Company is presented under the "Silver Mines" in this letter.

Drifting operations at the 300-ft level of the Bidgood property continue to be favorable. The vein has a greater width than the drift, and, in places, visible gold occurs. Considerable lateral work will be done before the shaft is continued to deeper levels.

Word has just been received at the mine in Boston Creek from the head office of the Miller Independence Mines, Limited in Ohio that the $50,000 bond issue, under offer to existing stock-holders, has been fully subscribed, a matter which, in these days of financial depression, can be accepted as indicative, in the most practical fashion, of the enthusiasm and feeling of satisfaction permeating all those associated with the enterprise.

The recent period of slackness at the property has been well utilized for work of a preparatory nature and diamond drilling, which has been under discussion for some time past, will be commenced at the earliest moment. It is planned to carry out most of the operations in the "A" shaft at the 500 ft. level but the neighborhood of the "D" shaft, with its spectacular showings of telluride ore, will also probably receive its share of exploratory attention.

TORONTO MINING QUOTATIONS.

Quotations on Active Stocks on Standard Stock Exchange for Week Ending 2nd July, 1921.

	High	Low	Last
SILVER			
Adanac Silver Mines, Ltd.	7/8	7/8	7/8
Beaver Consolidated	30	29½	29½
Chambers-Ferland	6	5	5
Coniagas	1.75	1.75	1.75
Crown Reserve	8¾	7¼	8
Great Northern	¾	¾	¾
Kerr Lake	3.35	3.30	3.30
La Rose	17	15	17
McKin.-Dar.-Savage	16	16	16
Mining Corp. of Canada	1.05	1.05	1.05
Nipissing	4.80	4.75	4.80
Ophir	1¼	1¼	1¼
Peterson Lake	4¾	4¾	4¾
Temiskaming	13	12	12
GOLD.			
Apex	1½	1½	1½
Atlas	21	20	21
Dome Lake	5	4½	4½
Dome Mines	20.00	18.50	20.00
Gold Reef	2¼	2¼	2¼
Hollinger Consolidated	7.20	7.06	7.06
Keora	10½	10	10
Kirkland Lake	40½	40	40
Lake Shore Mine, Ltd.	1.20	1.16	1.18
McIntyre	1.92	1.85	1.86
Newray Mines, Ltd.	5	4½	4½
Porcupine Crown	13½	12¼	13
Porcupine Imperial	⅜	⅜	⅜
Porcupine V. N. T.	17½	16	16½
Preston East Dome	2⅜	2¼	2⅜
So. Keora	17¾	17	17¾
Schumacher	22	22	22
Teck-Hughes	12	11	11
Thompson Krist	4¾	4½	4½
West Dome	6½	6½	6½
Wasapika Gold M., Ltd.	8⅜	7¾	8
OILS.			
Perol Oil	25	25	25
Vacuum G.	7	6⅞	7

TRETHEWEY.

The plant of the Trethewey mine at Gowganda was seriously damaged in the recent fire and development work has necessarily been temporarily discontinued. The shaft had reached a depth of about 270 ft. when work was stopped by the fire.

BIDGOOD.

Development of the Bidgood property in Lebel township is reported to be giving good results. Drifting at the 300 ft. level is in progress.

SILVER SHIPMENT FROM MAYO.

"Dawson Weekly News" reports under date of 17th June the arrival of barges containing 54 tons of silver ore from Keno Hill. This shipment, together with a previous one of 500 tons, will be sent to the smelter via St. Michael. It is the largest single shipment of silver ore as yet made from the Yukon Territory, and is part of 2,350 tons which so far have been selected from Keno Hill.

TORONTO COAL PRICES.

Toronto, th July. — Toronto coal prices are absolutely identical with those of a week ago. The attitude of the public, too, shows no change. They are still delaying their purchases of coal in the hope that prices will drop — a hope which is not likely, having regard to the logic of present conditions, to be realized. There is one aspect of the coal situation which deserves notice, and that is the marked decrease in Lake shipments of lump coal. These shipments are falling off very rapidly. At present, indications are that there will be a considerable stiffening in the price of slack coal pretty soon.

TORONTO METAL QUOTATIONS.

Below are the fair average prices for ingot metals (in less than car-loads) at Toronto:

	Cents per lb.	
	June 29th	July 6th
Copper, electric	17	17
Copper, casting	16¾	16¾
Tin	39	38
Lead	7	7
Zinc	7½	7½
Aluminum	30	30
Antimony	9	9

MONTREAL METAL QUOTATIONS.

Following are the fair average prices for ingot metals (in less than car-loads) at Montreal:

	Cents per lb.	
	June 29th	July 6th
Copper, electric	17¾	17¾
Copper, casting	17½	17½
Tin	36	36½
Lead	6¾	6½
Zinc	7	7¼
Aluminum	31	31
Antimony	7¼	7¼

BOOK REVIEW.

Longwall Coal cutting Machinery. G. F. F. Eagar. 109 pages with index. Sir Isaac Pitman and Sons, Toronto. Price one dollar.

This addition to Pitman's Technical Primer Series is recommended to all who are connected with the use of coal-cutting machinery in longwall faces, or who contemplate adopting a practice that is likely to develop in Canadian coal mines. The economic aspect of coal-cutting by machinery, types of machines, namely, disc, chain and bar machines are admirably summarised. The choice of type of cutter to suit local conditions, the position and depth of the cut are discussed and illustrated by examples of undercutting, overcutting and cutting in bands in the seam. The comparative advantages and disadvantages of available motive powers are clearly contrasted, and there is an interesting description of the new development of the compressed air turbine as adapted to coal-cutters. Taking into consideration the small size and low cost of this primer, the writer has succeeded in condensing much practical information, dealing chiefly with English practice, that mining students, in particular, will find quite helpful.

British Columbia Letter

Metal Mines.

The first application under the "Radium Act" of 1914 has been received by the Provincial Department of Mines. A prospector claims that he has discovered the exceedingly valuable mineral in place on Vancouver Island and he wants the reward which is offered by the terms of the Act in question. No particulars of the deposits, their location, character, etc. are given, the bald statement being made that the discovery has been made and that the staker is prepared to have the fullest investigation made to establish the truth of his assertion. The Act referred to describes radium as "all deposits of carnotite, pitchblendes or other ores containing radium in sufficient quantity for commercial extraction." The Lieut.-Governor in Council is empowered to place a reserve on all radium within the public lands of the Province and at pleasure to remove such reserve. It also is set out that "to the first person proving to the satisfaction of the Lieut.-Governor in Council that he has discovered radium within the Province the Lieut.-Governor in Council may pay a reward not exceeding five thousand dollars." The Executive in addition is authorized to make rules and regulations for the exploration, occupation and purchase of radium-bearing ore lands and "to make such other rules and regulations for conserving and developing radium within the lands of the Province as may seem proper; and to make provision for the retention by the Crown of an interest, not exceeding fifty per cent, in all radium produced from the radium-bearing lands of the Province, or for levying and collecting a royalty on such production of radium." The application having been made by one who is convinced that he has found the precious ore "in paying quantities" it remains for the technical officers of the Department to undertake the inspection and investigation required either to prove or disprove the claim. If the mining man proves important developments in connection with the mining industry of the Province in recent years. The practical value of the mineral to humanity, its scarcity in comparison with the growing demand, make the prospect of British Columbia proving a source of supply exceedingly attractive from whatever point of view is considered.

Stewart B.C.: The Lindenbourg Brothers intend doing considerable development on the Seven Mile Property, which is situated on the main road to the Premier Mile, seven miles from Hyder. A tunnel already has been driven 340 feet. The ore carries gold, silver and lead and, while assays have been obtained as high as $200 to the ton, the owners do not consider it a shipper. They are of the opinion that a sufficient tonnage of concentrating ore will be proven to warrant the construction of a Mill. Further work is to be done this year on the Fish Creek Mining Co's Claims, the intention being to put a crew of from five to seven men on the job. A 240-foot tunnel already has been driven and last year some fifty tons of high-grade ore was sacked but was not shipped owing to lack of transportation facilities.

Alice Arm B.C.:—A meeting of the North Coast Branch of the Canadian Institute of Mining & Metallurgy was held recently at Alice Arm, Major C. B. North, of the Dolly Varden Mine, occupying the chair. Among the speakers were Bert Kergin, M.L.A., G. P. Riel, G. C. Mackenzie the secretary, H. Fowler, M. Peterson, H. M. Roscoe, and John Stark. The members afterwards were the guests of the citizens of Alice Arm at dinner. George Clothier, government mining engineer, has been spending a week examining various properties in the Illiance and Kitsault valleys.

Victoria B.C.: The announcement that the Great Northern Ry. Co. proposes to close down its branch railway from Rossland to Northport Wn. on the 30th of June next is made the subject of a vigorous protest by the Rossland Board of Trade to the Premier and the Minister of Mines of British Columbia. The members of the organization in question take the stand that the withdrawal of this service will seriously interfere with future mining operations in the Rossland Camp. In particular it will prevent shipments from the Velvet Mine, which has been operating steadily for the past year. Rossland's gold production, it is stated, will be $1,500,000 this year and that a better showing is promised for the future. Any move calculated to remove railway or smelting competition, it is argued, may discourage outside capital. The granting of the right to abandon branch lines also would mean the establishment of a dangerous precedent. Both Premier Oliver and Minister of Mines Sloan took up the matter with the Chairman of the Board of Railway Commissioners, Ottawa, urging that the views of the people of Rossland should have every consideration, declaring that the withdrawal of this railway would have a serious effect on the mining in that section of the Province, and asking that the Board exercise whatever powers may be vested in it in the interests of the affected part of the Province. There seems to b a doubt, however, as to the authority of the Board to prevent the railway company carrying out the policy its announcement appears to forecast.

Prince George B.C.: The placers of the Goat River, about 120 miles east of Prince George, are bringing good returns. Seven Chinamen brought $1400 worth of gold dust to the town recently, reporting that they had cleaned it up in the course of two weeks. Several white miners also are working on the river bars.

The British Columbia Department of Mines has received an invitation from the United States Bureau of Mines to be represented at a series of conferences to be held on September 1 to 3 inclusive, 1921, at St. Louis, Missouri for the purpose of "standardizing the use of mine-rescue breathing-apparatus and to consider the possibilities of standardization in the apparatus itself." It is added that "since the mining departments of a number of foreign governments are also actively engaged in similar work it is proposed to make these conferences international in character and if possible to have present official representatives from the several countries." Hon. Wm. Sloan, Minister of Mines, has accepted the invitation on behalf of the Province. As a matter of fact it was he who is responsible for the initiation of the movement. Shortly after the disaster in the "Black Diamond" Mine, Pacific Coast Coal Co., Wn., which occurred July 10th, 1920, and in which three men wearing mine-rescue apparatus lost their lives, he took up with the U.S. Bureau of Mines the question of standardizing the apparatus and its use, with a view to simplifying the training of men, it being felt that the adoption of a common method would eliminate present possibilities of confusion in emergency and give greater assurance of the safety of those going underground under dangerous conditions for

purposes of rescuing human life. The suggestion was taken up promptly at Washington and the conferences referred to are the result.

Trail B.C.: J. J. Warren, president of the Consolidated Mining & Smelting Co. of Canada, in addressing the Board of Trail of Trail recently stated that, if the Dominion Government had placed an aqeduate tariff on copper rods and flourspar, the provincial pay rolls in this particular branch of the mining and smelting industry would have been very substantially increased; one 700 additional men now would be employed in the work. He criticised the Government for not taking action, notwithstanding that the difficulties in the way of the maintenance of the industry in the West without protection were pointed out to the Ministers in time to permit the necessary amendments to the Act at the last session of Parliament. He pointed to the large sums invested by his Company in their copper-rod mill at Trail and their Fluorspar plant near Grand Forks and added that, not only would these have been benefitted, but the Copper Mountain Mine, of the Canada Copper Company, probably now would be operating and furnishing work for many.

COLLIERIES.

The Coalmont Coal Company has undertaken the thorough development of its coalfield, situated in the Nicola-Princeton District. Operations have been closed down for some days but work if not already resumed, will be in a short time. The new carrying-cable, which will replace the present inadequate transportation system, is practically in place and will be ready for operation shortly. It is a lock coil, 1-⅝ inch cable, made up of 61 three-sixteenth-inch wires, arranged in four concentric layers, the weight being 18 lbs per yard. Therefore it should be able to stand whatever load may have to be put on it. A number of the towers had to be re-built and this time special cars has been taken to maintain suitable deflection angles, wherever a change of grade proved necessary. Coalmont is situated 2,400 feet above sea level and the mine at 4,000 feet. This gives a total drop of 1600 feet in a distance of about 3 miles.

The Coalmont powerplant contains as a.c. generator 480 mp. 600 v. at 150 revs., direct connected to a John Inglis cross-compound, Corliss condensing steam-engine. Steam is raised by two B. & W. marine boilers, originally designed for use in American torpedo boats. At the mine there are two boilers and an air-compressor. Edison miners' lamps are used, and a small d.c. generator will be installed for charging purposes. The machine shop is adequately equipped for colliery purposes.

The mine is reached from Coalmont by a waggon road, four and one half miles long, skirting Granite Creek Gulch. "To anyone unaccustomed to the dare-devil modes of travelling still in vogue in the more remote parte of the Province" declares one who recently made the trip" a trip on one of the five-ton motor-trucks, carrying supplies up to the mine, would seem quite an exciting experience. At times one side of the truck grazes a rock wall while the other hangs over a sheer drop of 1,000 feet."

The Coalmont coal measures, although somewhat limited in area, constitute a rather rich field. This may be described as a number of seams, or rather one seam, about 140 feet thick, with a number of intervening rock bands varying from 10 to 15 feet in thickness. The field is intersected by at least three dykes and the associated sandstones and conglomerate are partly capped by a flow of olivine basalt. All the present workings are in the upper benches of the seam. The quality of the coal is good and the demand in excess of the capacity of the present workings. Mine timber of excellent quality is cut on the hill-side and loaded on the waggon road at a distance of about one mile from the mine.

An amendment to the "Coal Mines Regulation Act" was passed at the last Session of the British Columbia Legislature providing that "no lamp or light other than a locked safety-lamp of a pattern approved by the Minister of Mines shall be allowed or used underground in any mine." It further was provided that this change should become effective on the 1st of July, 1921. Formal notificationhas been given the various collieries of the Province that the new rule will be rigidly enforced, the Hon. Wm. Sloan, Minister of Mines, being determined that no coal mine within his jurisdiction shall, after the date set, use anything but approved safety-lamps underground. By his instructions each of the operators have been provided with a list of "approved" safety-lamps. There are included in this the electric lamp manufactured by the Edison Storage Battery Co.: the Concordia portable electric-lamp, manufactured by the Concordia Electric Co., Pittsburg; the Wico portable electric mine-lamp, manufactured by the Witherbee Igniter Co., Springfield Mass.; the Pioneer Electric Mine Lamp Co., Philadelpria Pa.: the Wheat portable electric mine-lamp, manufactured by the Hoehler Manufacturing Co., Malboro, Mass.; and five types of flame safety-lamps. It is specially noted, however, that "while the use of flame safety-lamps is permitted it is the policy of the Department of Mines to encourage the use of approved electric safety-lamps for all persons underground in the coal-mines, except such flame-lamps as may be required by the officials of the mines in the carrying-out of their duty." The day of the naked lamp in British Columbia coal-mines under any conditions, therefore, is at an end. The Minister takes the stand that a mine that may be found safe today may develop dangerous conditions tomorrow and he had firmly adopted the principle of "safety first" where the lives of miners are concerned. It means that all collieries operating on any scale will adopt some form of electric lamp, if not immediately, certainly in the course of a few months. As a matter of fact the majority of the mines already are so equipped or have been preparing for the installation of these lamps.

The Minister of Mines has authorized the prosecution of the Pacific Coast Coal Mines Ltd., South Wellington B.C., "Mordon Mines," for infractions of the "Semi-Monthly Payment of Wages Act." This colliery closed down some months ago, having failed to meet the wage payments of their employers for a considerable period. Since then the men have secured judgment under the Mechanic's Lien Act against the Company for wages in arrears approximating $52,000. No action was taken under the "Semi-Monthly Payment of Wages Act" until this litigation was disposed of but now it is intended taking the necessary steps of the measure which provide for a severe monetary penalty on conviction.

EDITORIAL

Gold Mining in Northern Ontario

In this issue will be found a series of articles, prepared by the Consulting Editor of the "Journal," Mr. R. E. Hore, dealing with the present status of gold-mining in Northern Ontario. Mr. Hore reviews the growth of gold-mining at Porcupine and Kirkland Lake, describes the treatment of the gold-ores in these two main centres, and discusses the significance of the persistence of gold at depth at Porcupine and Kirkland lake, as so far proven. The information contained in these articles has been obtained by personal enquiry within the past few weeks.

Apparently gold-mining at Porcupine, which, notwithstanding its respectable proportions at this time, has only a boy's age, never until quite recently worked at anything like the capacity of the mines and mills. The hindrances which gold-mining at Porcupine has met with have been unrelated to the physical capacity of the camp to produce gold. The only serious drawback to capacity production from existing developed properties at Porcupine at this time appears to be an insufficiency and some seasonal uncertainty in the quantity of electric current, generated by water-powers, that is available. Provision of an adequate supply of water would seem to be the matter chiefly requiring outlay and effort in the Porcupine District.

Kirkland Lake daily assumes greater importance as a producer of gold. There are several other districts of Northern Ontario where gold occurs, but where gold-mining has not yet become so established as is the case at Porcupine and Kirkland Lake. It is fair to state that some of them are quite as promising as Porcupine was a little over a decade ago, and as Kirkland Lake was at a much more recent date.

Eminent students of currencies believe that the demand for gold is about to become more pronounced. The "Financier and Bullionist" of London quotes Mr. Samuel Evans, chairman and managing director of the Crown Mines, and a South African expert of acknowledged rank, as believing the pendulum has swung very far in a direction adverse to gold-mining, but that it is swinging back. Judging by precedent, Mr. Evans suggests the pendulum should in time go equally far in the other direction, which is likely to cause "a rise in the value of gold greater than anything that has ever been experienced since gold has been the enemy of civilized nations." The "Financier" states: "It is a point to remember that the annual production of gold in the world has diminished by 27 per cent. since 1915, while the probabilities are that in the course of the next few years the demand for the metal will be greater than it was since the adoption of the gold standard by England . . . . . History shows that the appetite for gold is intensified amongst populations which have for long experienced the extreme discomfort and harrassing uncertainty of a constantly depreciating paper currency."

In Canada we have our own good reason for increasing by every possible ounce the production of new gold. The renewal of the Order-in-Council banning gold exports for another year is an indication of our fiscal position. Every ounce of gold that can be won from the rocks of Canada lessens the strain upon our government and those who have to finance Canada's adverse trade balances. Gold-mining in Canada is good business, and a necessary one. It is encouraging to know that it is likely to prove profitable to those who have invested their money in Canadian gold-mines, because only a profitable undertaking can survive, and it is necessary for our fiscal well-being in Canada that gold-mining should be profitably undertaken on the largest scale possible.

The ability of the gold-mining companies of Northern Ontario to make headway when economic conditions were adverse, indicates that when conditions are favorable the industry should do very well indeed. In view of such a real possibility, it may not be amiss to suggest that taxation authorities and governments should recognize that the increase of gold production is a thing to be encouraged. The more profitable gold-mining is, the more people will become gold-miners, and the more new gold that is produced in Canada, the easier will our economic condition become.

ASSESSMENT WORK.

In the many discussions as to what should be done to encourage prospecting for mineral deposits it has been noteworthy that there has been little said by the prospectors themselves. Some of those interested in the subject have called attention to the need of more expression of opinion by prospectors in order that their view be better known by others who are interested in the mining industry. Recently there was formed a prospector's organization in Temiskaming and it is worth noting that this organization has shown that prospectors favor the lightening of the assessment work burden. The recent change in the Mining Act which makes the holding of claims comparatively easy seems to meet with the approval of the prospectors.

This development shows that the prospectors' desires were not well understood in the past. It was generally believed that the more stringent regulations which have been in force since the early days of intensive prospecting at Cobalt were regarded favorably by prospectors. In some cases the necessity of doing 240 days work in three years was a hardship; but in the main it was fortunate for the prospectors that the assessment work was required. Those who took over claims did so with the knowledge that they must do a certain amount of work and in many cases prospectors were employed at times when the work would not have been undertaken but for the fact that is was necessary to keep the title to claims clear. Thus the prospector had opportunities for working for wages in dull periods, earning a grubstake for his next venture. The general impression was that the regulations favored the prospector and it is more or less of a revelation that prospectors are in favor of the regulations which have recently come into force. Obviously it gives the prospector a better opportunity for disposing of his claim as he is not obligated to do much work on it for a long period. What he gains in ability to hold a claim in idleness however will in most cases be lost by failure to properly open up discoveries. From the examining engineer's point of view the assessment work is very desirable, for stripping and trenching is often neglected if not absolutely required of the prospector.

It will take some time to determine whether the new regulations have enough good features to offset the bad ones. The prospector's views have been asked for, however, and he should know as well as anyone else what is good for him. If the regulations prove satisfactory to the prospectors and result in more activity in prospecting many will be surprised but all will be pleased.—R. E. H.

THE LIGHT RAILWAY.

It is announced that the Ontario Government is not in favor of granting financial assistance to the company which plans to build a light railway to serve mining areas on either side of the Ontario Government railway. Reported statements of the Minister of Mines indicated that the Government was favorably disposed towards the project and would give assistance to the builders of the railway. It is a pioneering enterprise and many believe that the Government should take part in it; but evidently it will have to be done wholly by private enterprise. This puts a new light on the undertaking as these seemed reasonable ground for believing that the Government would give financial assistance to a company that help to supply transportation facilities in Northern Ontario.

Whether the promoters of the light railway will proceed with construction without aid from the Government is not yet known.—R. E. H.

COST OF STAPLE FOODS BY PROVINCES.

The assortment of staple foods used by the "Labour Gazette" to calculate the weekly cost of an average family budget, shows the cost by provinces, and there are some things in the statistics it is hard to understand. In the period before the war, running from 1900 to 1913, the cost of foodstuffs in the four western provinces was uniformly higher than in the remaining provinces in the East. Since the war the cost of foodstuffs in the West has declined until the latest figures show that they are cheaper in Manitoba, Alberta and Saskatchewan than in the Maritime Provinces. Another feature of the statistics is that the increase in the cost of foodstuffs since 1913 has, in the East, varied from 72 to 80 percent, whereas, in the West, it has reached only 44 to 54 percent. Comparing Alberta with Nova Scotia, as an example, the budget of foodstuffs now costs $12.53 in Nova Scotia against $12.02 in Alberta, and while the increase over pre-war figures is 72 per cent in Nova Scotia it has been only 44 percent in Alberta.

The inference is that the West is now more self-supporting, and less dependent upon imported foodstuffs than was formerly the case, and that in the East an exactly opposite development has taken place. With the negligible exception of Prince Edward Island, the cost of foodstuffs 20 years ago was lower in Ontario than in any part of Canada, but today the Ontario prices are higher than the average of the three prairie provinces. The growth of industrialism cannot be to blame, for the progress in industries other than agriculture has been very marked in the West, whereas in New Brunswick, for example, manufacturing has made very small progress, and foodstuffs have increased there by 77 percent since the war. Viewed as a whole, the figures vary within surprisingly small limits, considering the extent of Canada, and the great variation in living conditions. They seem to indicate more than anything else the influence of railway freights on imported foodstuffs, and suggest, as before stated, that the East is becoming more dependent on imported foodstuffs, and the West less so. The disadvantages which will accrue to the East if this tendency remains unchecked are sufficiently obvious.

WHEN WILL COAL BE A "BUY?"

The weekly report of the United States Geological Survey on bituminous coal production forecasts that the production of 1921 will be less than 400 million tons, and mentions that the last year the United States was able to manage with so small a quantity was 1909. Indications seem to be that bituminous coal production in the United States will be in 1921 about 100 million tons less than the average annual production during the seven years preceding.

The British coal strike has caused a loss of probably not less than 75 million tons of coal. Although there have been notable recoveries in coal production in Europe, particularly in Westphalia and Belgium, the output does not yet total anything like pre-war figures. What Russia is doing the rest of the world does not learn, but the territory indicated by that geographical expression is certainly not producing much coal.

While Canada's coal output is relatively unimportant — except to Canada — it will be less in 1921 than it was last year.

It is fairly evident that the world is doing its best to avoid purchase and storage of coal, actuated by a general and world-wide hope that the price will come down, and that coal-miners will accept smaller wages and work longer hours. It is also fairly evident that coal production at the reduced rate of recent months cannot continue much longer.

The increase in the selling price of coal has cumulatively increased every serial operation of manufacture in which coal is required, but the process of "reconstruction" (to use a euphemism for wage reduction) has proceeded in the reverse direction, so as to have created the anomaly that in the two branches of industry which are most basic in character, namely coal production and rail transportation, wage reductions have come last, or not at all.

It is of course certain that the drastic reductions in the prices of steel products recently announced mean equally drastic reductions in underlying wages. The wages of steel workers have been very substantially reduced, and as probably 70 percent of the cost of steel represents the use of bituminous coal, it seems fairly evident that steel manufacture cannot proceed until the labour cost of coal production is lessened. It is also equally apparent that the lack of demand for bituminous coal is a result of the cessation of the use of coal in steel manufacture, and that this slackness of coal demand will continue until such time as the selling price of coal will permit its use in steel manufacture.

The post-war cost of coal is one on which most diverse opinions exist, but on its determination there waits all the long train of transportation, manufactures and agriculture. There will be very little progress restoration of general business conditions until the public has made up its mind that coal is "a buy". And in this regard, the domestic consumer is not of decisive importance.

DISTRESS AT CORNISH MINES.

The South African Mining Journal for May 28th contains a letter to the Editor from the Chairman of the Central Relief Committee at Camborne, Cornwall, appealing for financial help from Cornishmen and their descendants abroad for the Cornish people at home, where every "Bal" is idle. The letter is one which seems to indicate that mining in Cornwall is for all practical purposes finished, and that further emigration of Cornish miners will be forced by the decay of the industry of mining in the County. There are, however, a number of old miners and their dependents who will be unable to find work of any kind so long as mining in Cornwall is dead, and, as stated the industry seems depressed beyond hope of revival. There are a number of Cornishmen in Canada, and many more in the United States. Contributions would be gratefully received by Joseph Cock at Camborne, who writes: "If you can help, help soon."

WATER POWER DEVELOPMENT AT PORCUPINE.

The increasing demands for power of the mines at Porcupine are expected soon to result in the development of additional water powers. The unusally light rainfall of last summer and fall resulted in a severe shortage of power during the winter, and uneasiness is felt as to requirements being met with in future. The present demands of the mining companies may be satisfied if the rainfall is normal this Summer and Fall; but the plans for increased output as well as assurance of power for present output are dependent upon more power being developed. On this account both the Hollinger and McIntyre companies have taken up water-power rights with a view to development. It is considered probable, however, that the power company itself will make arrangements for meeting the demand. The McIntyre Company has surveyed its water-power at Sturgeon Falls, on the Mattagami River, and the Hollinger Company has surveyors at work on its power at Long Sault Rapids and Kettle Falls, on the Abitibi river. The development of this water power will be a very big undertaking, and it will take many months to make the additional power available. As an insurance against shortage, and to fill additional requirements, however, power development on a big scale will undobtedly be begun soon by either the mining companies or the power company.

Timmins, the chief town in Ontario's premier gold mining area has a population of 6,000. Freight receipts for the year 1920 were $725,000; payroll for the year totalled $4,500,000; assessment was $2,225,000; revenue from taxes, royalties and rates was $170,000; bank clearings for the year amounted to $7,000,000. Twelve years ago there was no town at or near Timmins and the nearest railroad was thirty miles away.

Gold Mining in Northern Ontario

A Review of the History of Gold Mining in the Porcu pine and Kirkland Lake Districts, the Milling Practice, and the Significance of the Persistence of Gold at Proven Depth. With some Reference to the Outlying Properties.

By REGINALD E. HORE, Consulting Editor.

GOLD MINING AT PORCUPINE.

The development of gold deposits at Porcupine has resulted in the establishment in Ontario of a gold mining industry which seems destined to become one of the mainstays of the Province. Already the industry has assumed large proportions, employing several thousand men, purchasing annually supplies that amount to several million dollars in value and producing now over $1,000,000 per month in gold. What has been accomplished during the past twelve years is best appreciated by those who know the history of the industry, for many difficulties have been encountered and overcome successfully by the men who are chiefly responsible for the results that have been achieved. The war period and the subsequent period of high prices might easily have killed a less robust infant. But before the war there were times when the men who put their money and energy to the task of making gold mines had even more serious difficulties to face. They were venturers in a new and unproven field in a Province that had not previously given a good account of itself as a gold producer. They had good reason to be doubtful as to the results of their enterprise, even if fortune favored them. Then when development had given more confidence, fires and strikes were added to the mine operators' troubles. In spite of delays and losses occasioned by fire, strike and war the industry has nevertheless grown in twelve years, since the discovery in 1909, until it has put Ontario prominently before the world as a gold producer, and given the Province the distinction of having one of the best gold mines. But greater even than the progress made at Porcupine is the new aspect it has given to the gold possibilities of large areas in Northern Ontario. It will take many years to mine the ore at the mines now producing at Porcupine and Kirkland Lake and it will be strange indeed if many new producers are not added to the list during the lives of the present producers.

To appreciate the present situation at Porcupine it is well to recall that twelve years ago the present Hollinger, McIntyre and Dome Mines were but minute patches of the forest, thirty miles from the railroad. The prospectors in 1909 made little clearings around their discoveries; but the area was still practically virgin forest and travel was by trail, river and lake. Then came the men who developed the properties, who risked their money at a time when the difficulties were obvious and the extent and value of the deposits very doubtful. To transport light machinery and supplies rough roads were cut through the forest. In Summer, supplies were dragged part way through the muddy roads and trails and carried on small boats on river and lake. Then the windlasses and head frames appeared on the outcrops and the clearings widened and more log-cabins rose. The quartz veins were stripped and carefully sampled. Shafts were sunk and ore of doubtful value hoisted. Then at the Dome and Hollinger results of exploration led to heavier expenditures on development. At the Hollinger a little Tremaine mill was installed and proved to be a big factor in the history of the mine. At the end of the year 1910 the Dome and Hollinger were being vigorously developed. The McIntyre was still an interesting prospect. Around Porcupine Lake settlements were springing up. The winter road was crowded with teams hauling supplies from the railroad. The operators were asking for the construction of a branch line to Porcupine. During the following year construction of a railway to the Dome mine was begun and later, after much urging, the railway was extended to the Hollinger. Towns sprang up rapidly at Porcupine Lake and Pearl Lake. Of those at Porcupine Lake, South Porcupine, nearest to the Dome mine, grew largest. The Pearl Lake settlements gave rise to the present town of Schumacher. The town of Timmins, laid out later across the lake from the Hollinger, has become the leading town of the district, having a population of about seven thousand. During 1910 and 1911 a little gold was produced amounting in all to $50,976. Then in 1912 production on a large scale began and Porcupine has since that time produced about ninety per cent of the total gold output of Ontario. The output rose from $1,730,628 in 1912 to $9,397,536, in 1916 and then fell off slightly, when under normal conditions it would have continued to increase. It is only within the past few months that Porcupine mines have been making the production that was planned for some years ago. War conditions, and then labor and power shortage, have kept production down. Now deeper development is being planned and capacity production being a reality increased capacity is being talked of.

The Hollinger mine is Porcupine's prize exhibit. There was a time, some few years ago, when a less familiar name threatened to become more prominent; but with the organization of the Hollinger Consolidated Mines the Acme mine has become part of the Hollinger. Had it not been for the consolidation the Acme mine would itself be one of Porcupine's best mines. Much of the best ore at the Hollinger comes from the Acme claims. The main veins on the Hollinger strike north-easterly across the property, bending southerly at the west and east from the course at the original Hollinger claim. The easterly extension of the deposits or series of deposits crosses into the McIntyre property. The western and southern extension has not been proven beyond the boundaries of the property. The best part appears to be the Acme claim between the original Hollinger and the McIntyre. Good ore extends across the Hollinger, but development has apparently been more successful towards the east than towards the west. The vein system which sweeps across the Miller-Middle, Hollinger and Acme claims and extends into McIntyre ground is now yielding over $30,000 in gold per day and may be confidently expected to yield some such amount daily for many years. The men who developed the deposit have good reason to be well satisfied that they know an ore deposit when they see one. The deposit, if we use the word to embrace the system of veins, contains a number of ore bodies which can be profitably mined under present conditions and also a very large tonnage

of somewhat lower grade which under better conditions may be worked profitably. The reports of the Hollinger and McIntyre companies show that ore reserves of very substantial size and values are proven and that exploration indicates the presence of a large quantity of ore yet undeveloped. In the recently issued annual report of Hollinger Consolidated Mines, Mr. A. F. Brigham, the general manager, gives an estnmate of the ore that will average over $6 per ton. The figures will be found on another page in this number of the "Journal." Refercnee to these figures will give a fair idea of the gold content of the developed ore.

In developing the Hollinger and McIntyre mines a number of shafts were sunk on the veins and it was found that they are nearly vertical and that the main orebodies hold well with depth. Drifts were run along the veins and the several shafts connected. As development proceeded at the Hollinger the work was centralized more and more at one shaft and main haulage-ways established at the 425 and 800 ft. levels. At the lower levels development is carried on from a long tunnel south of the vein system which is used as a main haulage way. From this tunnel crosscuts are run through the veins. These crosscuts serve as haulage ways from the

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Hollinger Mine ten years ago.

drifts to the cross cuts and then hauled by electric locomotive to the main tunnel and hence to the hoisting shaft. Below the 800 ft. level development has been carried on by winzes. A level has been established at 1250 ft. and from this level raises are being cut at the two operating shafts. Most of the ore that has been taken from the Hollinger mine up to date has come from above 550 ft. Stopes are now being opened up on two veins at the 675 ft. level.

At the McIntyre, development near surface was not very satisfactory. The deposits there were irregular and the ore relatively low-grade. In the first few years of operation the management found it difficult to locate any great quantity of ore and very difficult to make any profit on the ore that was developed. The production up to March 15, 1915 was 127,349 tons which yielded $1,020,250, Prior to 1914 operations gave no profit. As development proceeded, however, and greater depth was reached, ore more like that at the Hollinger was encountered and mining on a profitable basis became possible. Then with greater depth the McIntyre began to loom up as a big mine and now the probabilities are that McIntyre will develop into a big mine with depth. It is already a large producer; but apparently will be much larger. In the early days the strong point in McIntyre's favor was that it seemed likely to carry the extension eastward of the Acme veins. Thanks largely to the skillful management of Mr. R. J. Ennis the mine lived through some very trying times until eventually the better orebodies were discovered at greater depth.

At the Dome mine a big body of ore was found near surface and about one million tons was mined from above the 100 ft. level. This was taken from open pits at a relatively low cost. As development proceeded, however, it was found that there was much poor ground at lower levels. Then another big orebody was opened up below the first ore. Again this second one became poor. Further development has opened up a third big orebody at the tenth level, the present lowest level. The Dome orebodies are not tabular like those at the Hollinger and it is not easy to estimate quantities or values between levels. Such information as can be gleaned from the company's recent report indicates that the new orebody is higher grade than those nearer surface and that it is of good size.

Dome Mine and Mill.

The history of the three mines has thus been quite different. Hollinger has advanced on a fairly steady course. McIntyre started weak and has grown strong. Dome has been in and out with a fairly good average and a strong present bottom. The story of progress reflects very well the nature of the ore deposits at the three mines.

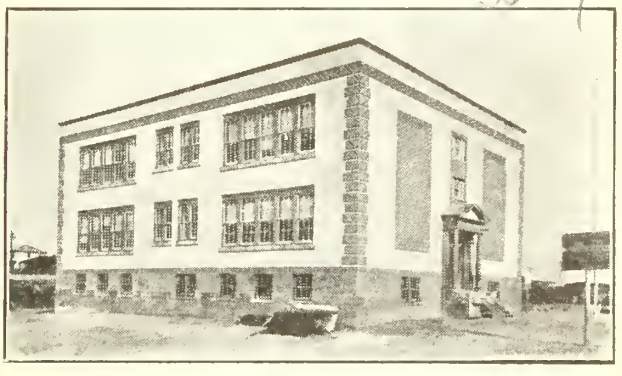
The development of the mines has resulted in quick settlement of the district. The millions of dollars disbursed by the companies for labor have given the community a considerable buying power and many merchants have established good business enterprises. The railroad has found in the mining industry its chief source of revenue and the Porcupine branch of the Ontario Government railway is one of its busiest sections. Along the line, lumbering and pulpwood enterprises have sprung up. Farmers settling in the district have found a good market for their farm products and work when they needed it at the mines and lumbering camps. In the towns good schools have been erected and recently the Hollinger company finished construction of a splendid hospital. Where a few years ago the forest

Panoramic view showing McIntyre Mine and Mill.

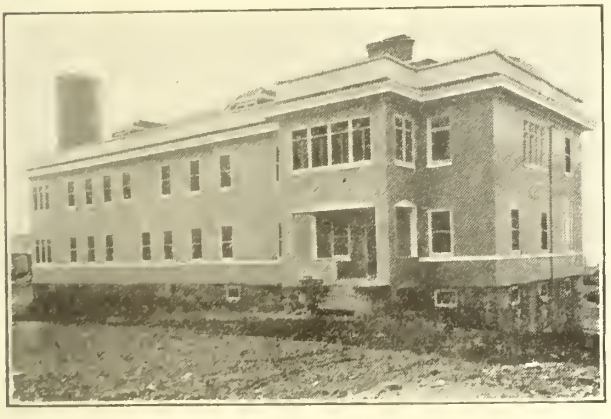
Hotel Goldfields, Timmins.

Separate School, Timmins.

Hollinger Company's Houses, Timmins.



Timmins Public Shool.



Hollinger Hospital, Timmins.

Timmins Skating Arena.

COMMUNAL FACILITIES AT TIMMINS, ONT.

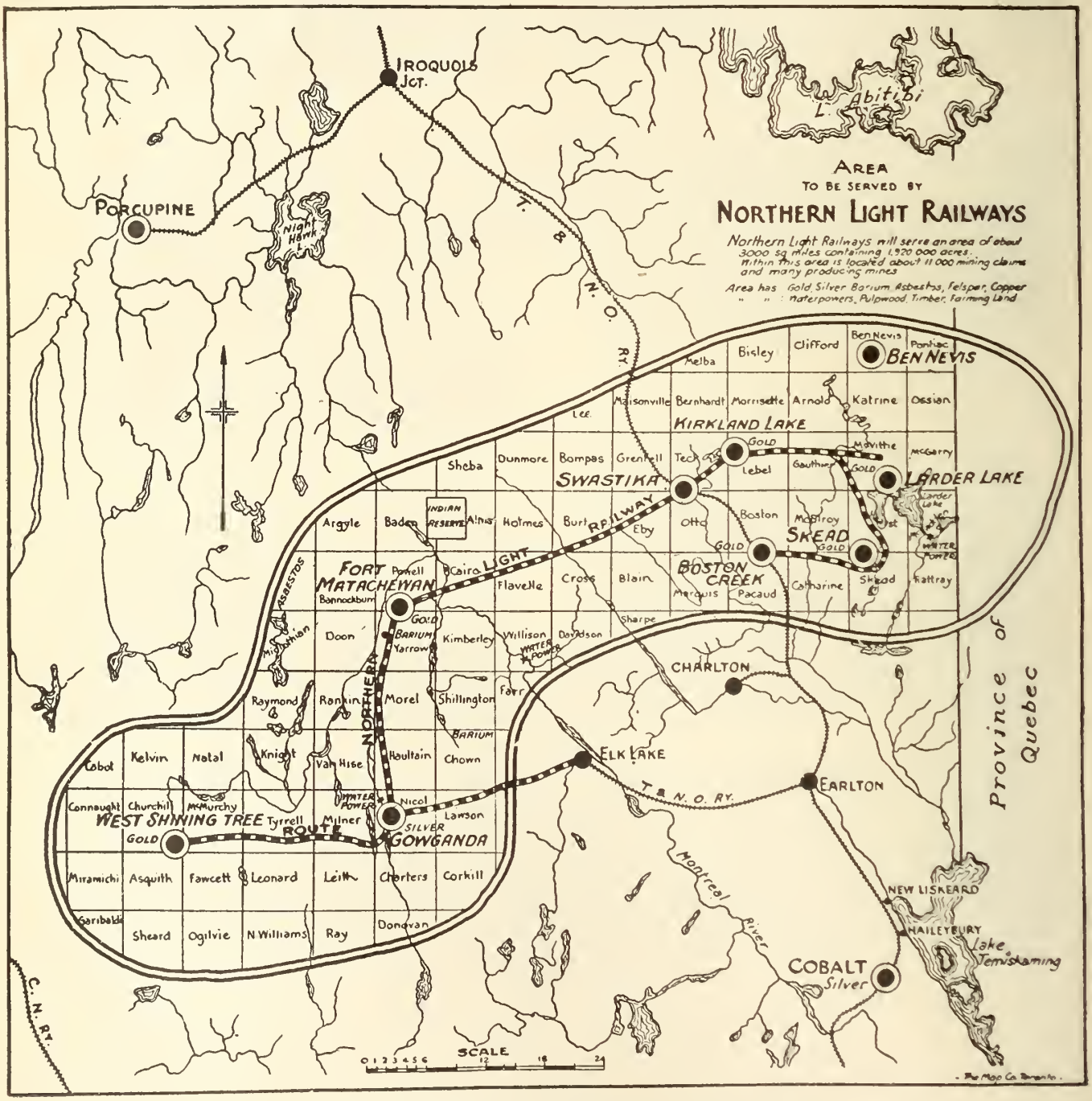
was unbroken there is a skating arena and a golf course. Along the course of the old trail from Mattagami River to Miller Lake there is now a road along which motor cars run. Here between Timmins and the river a clearing has been made for 150 houses that are to be built for Hollinger workmen this summer. Crossing the old trail is the power transmission-line from the plants on the Mattagami which make the river run the machinery at the mines and mills and provide light for mines, shops and houses.

The business done in Timmins is shown by a report by the Board of Trade on conditions in 1920, when activity was not as great as it is now. During the year freight receipts totalled $725,000, bank clearings amounted to $7,000,000, the assessment totalled $2,225,000. The population at the end of 1920 was about 7,000 and it has grown rapidly during the past few months. Pay-rolls totalled $4,500,000 in 1920 and will be much larger this year.

During 1920 there was a great shortage of labor at the gold mines; but conditions changed rapidly during the winter and there is now a plentiful supply of workmen. There is a surplus of unskilled labor, but experienced miners will still find opportunities for employment at the gold mines. During the past winter there was a shortage of power and the Hollinger and McIntyre have both acquired water rights. The Hollinger alone could have used all the power available last winter and proposes to develop the Long Sault rapids on the Abitibi river. The McIntyre is making plans for development of Sturgeon Falls on the Mattagami river. It is possible that the mining companies and the power companies will in some way combine forces to meet the situation. Unless there is a plentiful supply of rain this

Summer and Fall the mines will probably be handicapped again by shortage of power before the year is over. Arranging for more water power is therefore one of the most important tasks of the Porcupine gold-mine operators this year. The production of gold during the coming year should far surpass that of previous years if the necessary power is provided.

The mines of Porcupine are at present supplying the mills with about 4,800 tons ore per day. The three companies employ about 2,600 men. At the present rate of production the output for 1921 will be much larger than in any previous year. In 1920 there was treated at Porcupine mines 1,162,065 tons ore yielding $10,597,572 gold and 93,872 oz. silver. Hollinger treated 650,205 tons yielding $6,164,264 in gold; McIntyre 191,032 tons yielding $2,202,100 and Dome 295,220 tons yielding $2,005,640 in gold. This output was made in a period in which labor was scarce followed by a period when there was a shortage of power. It does not therefore show capacity output by any means.



Proposed Scheme of the Northern Light Railway.

It is understood the Ontario Cabinet will not extend financial aid to this project. The map shows how necessary such a railway is for the gold prospects east of Kirkland Lake, and how useful a railway would be for the area indicated.

Gold Mining at Kirkland Lake

General View, Kirkland Lake.

Kirkland Lake now has four producing gold mines and next to Porcupine is Ontario's leading gold district. The ore mined is relatively high grade, being the richer parts of a single mineralized zone which extends east and west from the lake which gives its name to the district. This deposit was developed at the Lake Shore mine, where it is known as No. 2 vein, and has made that company's operations very profitable. To the west it has been developed at the Teck-Hughes and Kirkland Lake Gold company's mine. To the east it is being developed at the Wright-Hargreaves. Further east and not yet definitely connected with this deposit similar ore was mined at the Tough-Oakes mine.

The first producer at Kirkland Lake was the Tough-Oakes mine. Here very rich ore was mined for a few years, much of it averaging $20 to $25 per ton. About $2,000,000 in gold was produced at this property while it was being operated. An attempt is now being made to find extensions of the orebody which was cut off by faults laterally and at depth. This work is being carried on by Kirkland Lake Proprietary Ltd, which corporation controls also the neighboring Burnside property and is understood to have an option on the Sylvanite. The Tough-Oakes orebody was an exceptionally rich one and it is reasonable to expect that considerable money will be spent in an endeavor to find more such ore on this and neighboring properties.

During 1912 and 1913 when development work was being carried on at the Tough-Oakes some of the ore was hand sorted and shipped out for smelter treatment; 101 tons of such ore yielding $46,221 or about $457 per ton. In 1914 the company shipped 212 tons ore averaging $350 per ton and milled 3,492 tons ore averaging $22.33 per ton.

At the Lake Shore milling operations were begun in March 1918 and during the first nine months there was treated 14,498 tons ore which yielded $24.76 per ton. In 1919 there was treated 11,907 tons which gave an average recovery of $24.67 per ton.

The mines at Kirkland lake producing in 1920, treated 91,237 tons ore which averaged $11.38. Lake Shore Mines Ltd., treated 19,779 tons yielding $502,113, Kirkland Lake Mines Ltd. treated 40,812 tons yielding $285,170 and Teck Hughes Gold Mines Ltd. treated 30,646 tons yielding $246,194. The average yield will probably be higher in 1921 owing to operations at the Wright Hargreaves mine.

The Lake Shore mine has been the making of Kirkland Lake as a mining district. The operations at the Tough-Oakes brought the district prominently before the mining public and led to much prospecting and development on neighboring claims; but it remained for the Lake Shore to demonstrate the fact that the main ore deposit crosses several claims and that it can be profitably worked at many places. To Mr. Harry Oakes belongs most of the credit for making the Lake Shore mine and incidentally its neighbors. By persistent effort he carried on development of the property and proved the presence of much high-grade ore in No. 1 vein. Then his company exploring under the lake developed the No. 2 vein which has been since found to be the main vein. The Lake Shore company installed a 60 ton mill and is turning out a steady stream of gold while continuing development on an extensive scale.

West of the Lake Shore, the Teck-Hughes company carried on development for some time without obtaining good results. Lately, however, the company has been more successful and is now reported to be operating profitably.

Adjoining the Teck-Hughes the Kirkland Lake Gold Mines Ltd., which is controlled by a Cobalt company, Beaver Consolidated, has succeeded in developing good ore and is a steady producer. Quite recently production has been begun at the Wright-Hargreaves where excellent ore is reported to have been developd. The mill has just been in operation about two months and no statement of character of ore being treated is as yet available. It is understood that the grade is about the same as that of the ore treated at the Lake Shore mill.

The gold production of Kirkland Lake district in 1920 was $1,033,478. Production this year is expected to show a very considerable increase as labor conditions are better and another important addition has been made to the ranks of producers.

The nature of the operations being carried on makes it appear probable that the grade of ore treated will be relatively high for some time. To break low-grade ore at present is not considered good policy. The present conditions favor the treatment only of the better parts of the known deposits. At some later date larger scale operations will doubtless be used for treatment of the lower grade ore.

Kirkland Lake is four miles from the Ontario Government railroad. For years it had very poor transpor

tation facilities. There is now, however, a very good stone road serving the mines and motor trucks are busily engaged in freighting supplies. As at Porcupine electric power is used at all the mines. It is expected that the area east of the mines will be opened up in the near future and construction of a light railway is being planned to serve this area.

As compared with Porcupine, costs are relatively high at Kirkland Lake. This is partly due to the nature of the ore deposits and partly to the nature and size of the operations being carried on. For some time it will be impossible to compare costs in the two districts fairly.

Some account of the nature of the deposits and of the methods of treating the ore at Kirkland Lake will be found on another page in this number of the "Journal." It will be evident that the discovery of such deposits and the development of them necessitates a great deal of careful and in many cases unproductive work and that the mining and crushing of the ore necessitates the expenditure of more work than is entailed in operations at Porcupine.

Kirkland Lake Mines, Ltd., Mill.

Teck-Hughes Mines.

Company Houses, Lake Shore Mine.

Wright-Hargreaves Mine and Mill.

The weathered surface of Kirkland Lake ore deposits is not of a nature to attract much attention. In many places ore and rock show few distinguishing features. Where there is considerable quartz the deposits are not so likely to be overlooked; but, the inconspicuous nature of much of the ore necessitates careful stripping, breaking and sampling. The removal of the overburden and the thorough examination of the stripped ground make prospecting slow and arduous. The difficulty of recognizing ore at the surface without systematic stripping and sampling has led to a desire to get underground where the troublesome overburden is avoided and a continuous horizontal section of the deposit can be sampled. Such prospecting is neeessarily costly and slow. The chances are that the surface will give a fair average of the character of a deposit and wherever possible it should be stripped and rigidly examined there. The surface section is as likely to prove an average section as that at any other level. There seems to be a belief that the deposits are better at depth than at surface and there are doubtless cases where this is true. To no small degree, however, the difficulty of recognizing the deposits at surface is responsible for the belief that the oreshoots do not run to surface. The two mines that have earned dividends had high-grade ore at surface. The best known vein lies for the most part under Kirkland lake. Much of the area is drift covered. The chances of finding more high-grade veins at surface still remain very good and further intensive surface prospecting will have to be done before the possibilities of the district are known. Much careful work has been done; but the difficulties presented to the prospector have made the work very trying. It is to be hoped that there will be a revival of the search for high-grade ore at surface, more use of pick and shovel in stripping leads, more liberal use of dynamite and more searching examination of the uncovered rock and particularly more sampling and panning. Such ore as has been mined at the Tough-Oakes and Lake Shore mines need not be in large quantity to make profits for the operators and such deposits are well worth looking for, even though much careful work has already been done and the chances of discovery to that extent made smaller.

The development work at the mines has given confidence in the persistence of ore in depth and in some cases has given results more satisfactory than the surface showings indicated. The finding of better-grade ore at the lower levels in some of the mines gives reason for hope that other deposits which are not very high-grade at surface may be found to be high grade at a depth of a few hundred feet. It is a fair speculation for those who can afford to stand the cost of shaft sinking and underground prospecting. There seems,

however to have been too easily assumed an idea that the high-grade deposits do not reach the surface and that therefore further surface prospecting in the neighborhood of the mines is not likely to give good results. This idea discourages those who might spend a relatively small amount of money at surface in searching for ore. It is well to remember that the present surface bears no known genetical connection with the ore deposits and that the difficulty of recognizing them may have easily resulted in the overlooking of deposits that are high grade at surface.

The producing mines will be able this year to make a good output, considerably larger than in previous years. A prosperous and busy year is anticipated.

The Lake Shore Mine and Mill.

TREATMENT OF GOLD ORES AT PORCUPINE AND KIRKLAND LAKE.

At all Porcupine and Kirkland Lake gold mines the cyanidation process of recovering gold is used. Crushing at the Hollinger is by stamps; but in all the other plants by ball-mills. The Dome has sixty stamps; but does nearly all its crushing in ball-mills, feeding only some of the larger-size crusher product to the stamps. At the Hollinger, where there are 200 stamps in operation, one ball-mill is in use. At the McIntyre, Lake Shore, Kirkland Lake, Teck-Hughes and Wright-Hargreaves, ball mills are used exclusively.

Primary crushing by gyratories or jaw crushers followed by rolls or small crushers prepares the ore for stamps or ball-mills. Tube mills are universally used to regrind the ball-mill or stamp-mill product. Pebbles are used in the tube mills; but recent experiments at the McIntyre and Dome mines have given results that are likely to lead to the use of balls instead of pebbles in the tube mills.

At the Dome, the tube-mill product goes to classifiers for separation of sands and slime which until recently were treated separately. At present all the product is slimed. Before treatment by cyanide the pulp is passed over amalgamating plates and a blanket. About two thirds of the gold recovery at the Dome is made by amalgamation. The pulp passes on for cyanide treatment.

At the Hollinger, concentration plays an important part. At the McIntyre cyanidation is depended upon entirely, the fine grinding being done in solution and the slimes passing direct to the tanks. Agitation and filtering decantation methods at the three mines have been described in technical articles and have not changed much since those articles were published. One notable improvement has been made by removing the air from the solutions before precipitation, as is now being done at the McIntyre and Dome mills. This effects a large saving in zinc. A noteworthy change in practice will be made when treating ore high in carbon content. The ore carrying much of this substance will be treated chemically before being cyanided, in order to reduce the precipitating activity of the carbon.

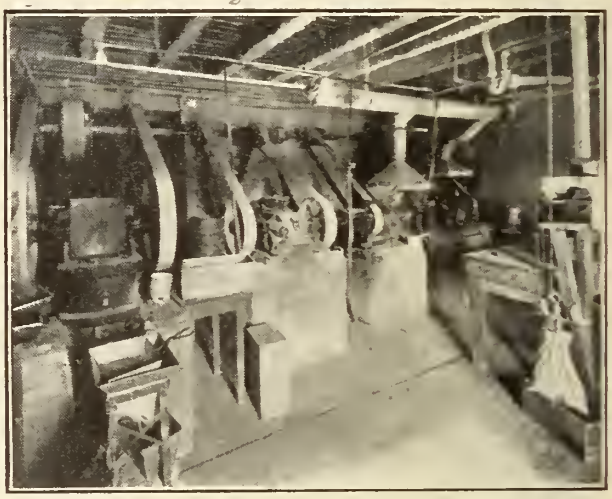
At Kirkland Lake the method of treatment is much the same as at Porcupine, the plants being designed for fine grinding followed by cyanidation. The most recently constructed mill at Kirkland Lake is quite similar to that at the McIntyre.

The Kirkland Lake ore however is much more difficult to crush than that at Porcupine and the crushing department of these mills is necessarily more prominent. A high recovery is made at both Porcupine and Kirkland Lake and the mill practise is given a high rating by metallurgists who are familiar with results obtained in many districts. The nature of the ore is responsible for the relatively low capacity of the grinding equipment at Kirkland Lake mills.

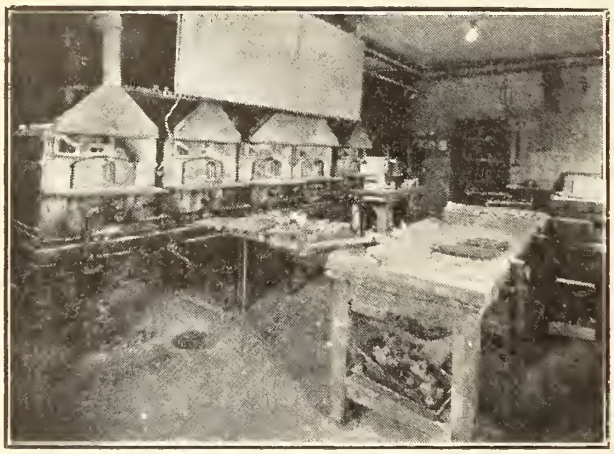
Descriptions of methods of treatment at the various mills are to be found in the publications of the Canadian Mining Institute, Ontario Bureau of Mines reports and in the reports of the Mining Engineer of the T. & N. O. Ry. Commission, and those who are interested will find that the literature is quite extensive and that many leading metallurgists have contributed to the development of the practise. Improvements and changes to meet new conditions are always being made and Northern Ontario is assuming a leading place in development of methods of treating gold ore as it has in the case of silver ore.

The plans for the new mill to be built this year at the McIntyre will be of considerable interest to metallurgists, as provision will be made for treating some ore that has been left unmined because of its carbon content. We hope in a later number of the "Journal" to give an account of the process devised to treat such ore.

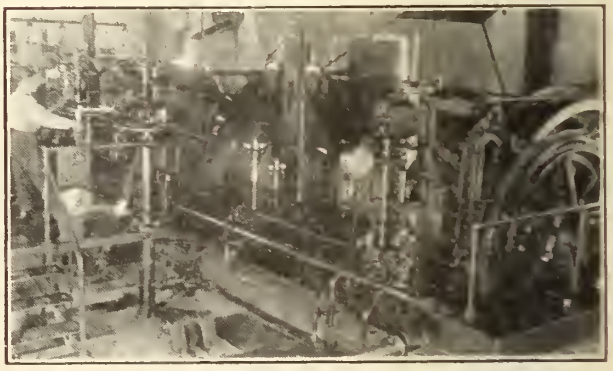
Gold Bars at Hollinger Refinery.



Sample Room, Hollinger.



Assay Furnaces, Hollinger.



Hoisting Drums, Hollinger.

Panoramic view, showing McIntyre and Hollinger Surface Plant

PERSISTENCE OF THE ORE WITH DEPTH AT PORCUPINE AND KIRKLAND LAKE.

That the gold deposits at Porcupine and Kirkland Lake will be worked to very considerable depths is becoming more obvious year by year. There is good reason to believe that development during the next few years will result in very large quantities of good ore being opened up below 1,000 ft. Lower workings are giving encouraging results and deepening of shafts at Hollinger, Dome and McIntyre will be under way this year if plans are carried out as expected.

The Hollinger-McIntyre series of orebodies are enclosed in carbonated grey rocks that appear to be for the most part altered volcanic rocks. The orebodies fringe masses of quartz porphyry and extend roughly in the direction of the axis of the porphyry mass. The main mass widens towards the east and near surface crowded the McIntyre to its southern boundary. Then orebodies were found north of the porphyry and the chief source of McIntyre ore latterly has been across the lake from the early workings. At the Hollinger the porphyry influence was not so noticeable in the early workings; but as development proceeded eastward the wedge of porphyry from the McIntyre began to influence the course of the openings. For some time therefore the determining of the shape of the porphyry mass has been recognized as one of the important structural problems, particularly at the McIntyre. The results of development during the past few years indicate that the porphyry is not such a serious obstacle as it seemed likely to be.

At the Dome mine the orebodies are for the most part enclosed in sedimentary rocks bordered by porphyry. Exploration has extended into dark colored igneous rocks and one orebody in these rocks has yielded a good tonnage of ore, but workings in the porphyry have resulted in that mass being considered the boundary of the ore deposits.

At both Hollinger and Dome the individual orebodies continue downwards nearly vertically. In the orebodies that have been opened up at the Hollinger a remarkable similarity has been found at the several levels. It is noteworthy because in many districts the oreshoots show pronounced pitch or rake along the veins. At the Dome also the orebodies showed no pronounced pitch and the second orebody was found below the first large one. The orebody now being opened up is to the east of the first two, but is apparently a distinctly separate one. The two areas are similar in that development has resulted in discovery of orebodies at depth further east than the orebodies which outcropped and also similar in that the orebodies which were worked from the outcrop had a vertical or nearly vertical pitch.

Most of the ore that has been mined at the Hollinger up to date has come from above the 425 ft. level and nearly all the remainder from above the 675 ft. The deepening of the shafts to the 1,250 ft. level is now underway. The manager estimates ore reserves at 4,087,083 tons carrying $41,719,670 or an average of $10.20 per ton. Of this 1,394,453 tons averages $14.02 and 1,748,456 tons averages $9.09. Ore reserves above the 425 ft. level amount to 1,433,409 tons and above the 825 ft. level there is an additional 1,629,753 tons. It is difficult without maps and assay plans to tell how individual orebodies are behaving, but the information given in the company's last annual report indicates that those that were good near surface have continued so for several hundred feet down and that some of the new orebodies are proving up well. The following tabulation of Hollinger ore reserves tells much of what is de-

A Stope in the Hollinger Mine.

finitely known about the orebodies. Taken in connection with developments at greater depth at Hollinger and McIntyre these figures are very impressive. Without careful study of the results of deeper exploration at the two mines it would be idle to make predictions as to the probable downward extension of the individual orebodies; but those who are interested in gold deposits will find in the Hollinger and McIntyre reports information that will strengthen their confidence in the belief that deposits of this character have no genetic connection with the present surface. The downward extension of any one orebody is likely to terminate just as does the lateral extension; but the downward extension of the ore deposit as a whole has no known limitations.

At the Dome mine development has proven that while the orebody first mined did not extend to any considerable depth, there are other orebodies below it. The first orebody yielded about one million tons of ore above the 150 ft. level, but did not behave well with depth. Then another large orebody was found a little deeper than the first. This also was of no great vertical extent. Now a third orebody is being opened up at the 10th level or 1145 ft. below surface and the mine is looking well at the bottom and the manager is planning on deepening the shaft in the immediate future.

At Kirkland Lake also good ore is being found at the lower levels of the mines. At the Tough-Oakes, which is at present without ore, there is a reasonable possibility that exploration will result in more good ore being found beyond the faults which cut off the orebodies. At the other mines work at the lower levels has given ex-

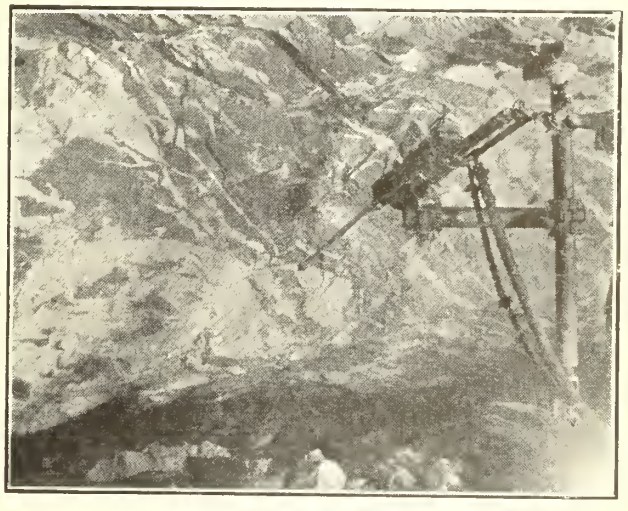
HOLLINGER ORE RESERVES (Developed Underground).
December 31, 1920.

Vein	Above 425 ft. Level Tons	Above 425 ft. Level Value	Above 800 ft. Level Tons	Above 800 ft. Level Value	Below 800 ft. Level Tons	Below 800 ft. Level Value	Total Tons	Total Value
10 Sh. D'p.	2,250	$20,250	.....	.....	.....	.....	2,250	$20,250
1	34,093	530,459	95,423	$1,110,122	2,335	$14,944	131,851	1,655,525
2	153,265	1,362,454	21,108	261,676	.....	.....	174,373	1,624,130
3	13,114	91,110	.....	.....	.....	.....	13,114	91,110
4	33,338	305,307	44,191	380,734	.....	.....	77,529	686,041
5	22,576	236,854	.....	.....	.....	.....	22,576	236,864
8	9,391	82,053	6,929	66,488	.....	.....	16,320	148,541
9	25,686	202,519	28,691	305,208	8,803	102,873	63,180	610,600
10	12,877	142,822	3,947	28,418	.....	.....	16,824	171,240
12	168,223	1,573,304	6,246	74,854	.....	.....	174,469	1,648,158
13	16,558	183,544	.....	.....	.....	.....	16,558	183,544
14	4,128	31,833	22,513	201,958	.....	.....	26,641	233,791
15	102,481	197,398	6,207	61,412	.....	.....	108,688	858,810
16	10,046	97,085	.....	.....	.....	.....	10,046	97,085
26	.....	.....	34,064	308,811	7,775	57,940	41,839	366,751
37	9,382	77,135	4,949	45,992	.....	.....	14,331	123,127
38	9,900	112,921	.....	.....	.....	.....	9,900	112,921
44	8,000	160,000	.....	.....	.....	.....	8,000	160,000
45	2,632	16,055	.....	.....	.....	.....	2,632	16,055
47	1,842	14,773	8,201	102,890	.....	.....	10,043	117,663
48	6,797	66,131	2,192	17,327	.....	.....	8,989	83,458
50	100,139	1,046,183	151,717	1,382,013	1,919	15,512	253,775	2,443,708
51	9,107	71,348	10,976	111,082	28,773	276,341	48,856	458,771
52	17,684	185,151	22,221	214,352	.....	.....	39,905	399,503
53	77,385	666,773	162,748	1,410,425	20,955	171,712	261,088	2,248,910
54	26,556	220,477	61,872	567,451	3,312	23,501	91,740	811,429
55	30,266	493,426	83,986	1,096,935	14,097	116,636	128,349	1,706,997
56	65,234	651,098	27,286	220,988	5,463	33,995	97,983	906,081
57	1,356	8,611	.....	.....	.....	.....	1,356	8,611
58	59,470	593,871	133,700	1,540,810	33,115	259,690	226,285	2,394,371
59	13,666	116,732	.....	.....	.....	.....	13,666	116,732
61	7,237	45,374	.....	.....	.....	.....	7,237	45,374
63	11,271	75,223	3,728	26,830	.....	.....	14,999	102,053
65	119,248	1,371,693	45,467	585,723	.....	.....	164,715	1,957,416
66	45,588	709,290	.....	.....	.....	.....	45,588	709,290
84	81,867	1,449,266	255,689	5,093,200	57,927	813,688	395,483	7,356,154
85	19,080	183,220	239,037	2,053,418	38,685	356,388	296,802	2,593,026
86	73,830	939,517	87,490	1,104,591	2,193	16,119	163,513	2,060,227
87	1,316	31,584	3,948	43,033	.....	.....	5,264	74,617
88	.....	.....	40,996	399,998	.....	.....	40,996	399,998
90	3,070	22,104	.....	.....	.....	.....	3,070	22,104
91	10,400	88,557	14,231	117,045	5,491	48,157	30,122	253,759
200	3,590	63,209	.....	.....	.....	.....	3,590	63,209
206	3,461	29,764	.....	.....	.....	.....	3,461	29,764
226	6,009	188,291	.....	.....	.....	.....	6,009	188,291
	1,433,409	$15,354,779	1,629,753	$18,933,784	230,843	$2,307,496	3,294,005	$36,596,059

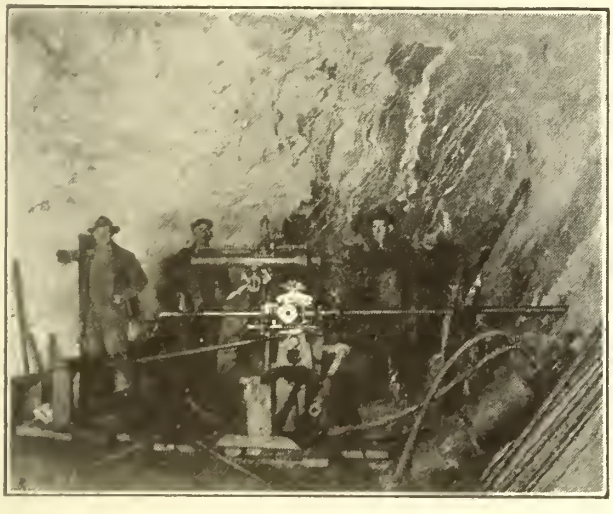
cellent results. At the Lake Shore the 600 ft. level is now being opened up. At the Kirkland Lake mine the 900 ft. level is said to be in good ore. None of the mines in this district are as yet explored at very great depth; but so far as development has proceeded it has increased confidence in the results that will be obtained in deeper workings. Some of the orebodies are evidently better than work at or near surface indicated. Increase, like decrease, in values with depth, however, is evidently not genetically connected with the present surface.

Developments at Porcupine and Kirkland Lake give reason for confidence that gold mining in these districts will continue to great depths. The present surface is apparently best regarded as a mere incident in the life-history of the ore deposits, being non-existent when the deposits were formed and having very little influence on them since. Structural problems will doubtless continue to arise with development; but the chances that values are better at depth are at least as good as the chances that they are poorer. The depth to which mining will continue will depend on the exploration policies of the operating companies as well as on the cost of mining. It is hardly to be expected that individual orebodies will extend downwards for several thousand feet; but there is good reason to expect that exploration will result in the discovery of a series of orebodies that will make mining profitable to great depths.

Surveying a Stope, Hollinger Mine.



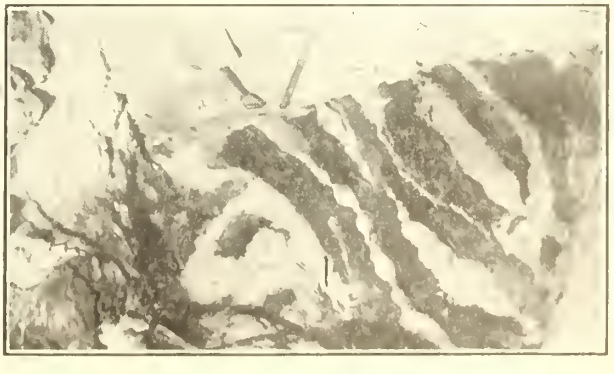
Stoping in Hollinger Mine.



Diamond Drill, Hollinger Mine.

The Shoveler at work, Hollinger Mine

Sampling Ore, Hollinger Mine



Ore at the face of the 10th Level, Dome Mines

Developing Mines

Associated Goldfields.

Development work is being steadily carried on at the Associated Goldfields property at Larder Lake. Transportation has been made more economical by use of a tractor which hauls heavy loads over the roads with comparative ease. The company has its own water power plant. It is understood that sinking of the three compartment shaft and opening up of the ore deposit at several levels will be the company's chief activity for some months. Considerable development work has, however, also been done at the Harris-Maxwell mine.

Argonaut.

The Argonaut Mining Co. has been handicapped for some weeks as a result of a fire which destroyed part of the plant. The company operates a stamp mill and has been recovering considerable gold while carrying on development work. The tailings from the temporary treatment plant will be treated later when a cyanide plant is installed. The recovery in the present plant is said to be about $7 from $10 ore.

Triflex.

During the past few weeks a number of men have been employed at the property of the Triplex Mining Co. in Shaw Township, Porcupine district. Major Harrison is manager of the company, whose property consists of a large number of claims including those of the Tommy Burns Mining Co.

McIvor.

It is understood that further development of the McIvor gold property will be carried on this summer. The property is near Swastika and about three miles from Kirkland Lake. It is proposed to do some development at the 100-ft. level which has already been reached in the shaft.

Lebel township.

A number of discoveries have been made during the past two years in Lebel township east of Kirkland lake. Recently a new discovery has been reported from the Moffatt-Hall property. During the past year considerable development work was done at the Bidgood property near Mud lake. The operating company, Bidgood Gold Mines Ltd., having installed plant for underground work and sunk a shaft and opened up veins at depth. The King Kirkland Gold Mines has several claims in this township. The discovery on the Moffat-Hall and discoveries on other claims now being prospected is giving considerable confidence to those who are developing claims in Lebel. Transportation facilities are much needed. It is expected that a waggon road will be constructed this year and there is a possibility that the township will soon be served by a light railway.

Skead township.

During the past few years a number of gold discoveries have been made in Skead township. Geologists of the Ontario Department of Mines examined the area recently and are now preparing a report on it.

Shiningtree.

A number of important gold discoveries have been made in the Shiningtree area and the development work done has shown that this area will be a productive one. Most of the work done was accomplished at a time when conditions were very unfavorable. Transportation has however been considerably improved by the construction of a waggon road from Westree. With the return to conditions favorable to gold mining renewed activity in the Shiningtree area is expected this summer. Several companies are planning to resume development work soon. At the White Rock a small mill has been installed to treat ore as development proceeds. The Wasapika company proposes to construct a mill which will be enlarged later when the mine is further developed. The Atlas company is planning to instal plant for development work. It is expected that the Churchill Mining Co. will resume development of its large property soon.

War conditions and the subsequent period of high prices have handicapped operators at Shiningtree and the lack of a good waggon road was a serious obstacle. Better progress may be expected now that these obstacles have been removed. The Wasapika orebody has proven to be a large one and rich ore is known to occur on several properties in the area.

Comfort-Kirkland Mines Ltd.

The Comfort-Kirkland Mines Ltd. has been incorporated to develop claims in the Kirkland Lake district. The property is situate between the Ontario-Kirkland and Minaker properties in Teck township. The directors are Dr. C. V. C. Comfort of Rochester, Andrew M. Stobie of St. Catharines, Malcolm Stobie, Archibald McVey Little and Henry M. V. Weller of Toronto. The capital is $1,500,000 in shares of $1 each.

Ontario Kirkland.

At the Ontario Kirkland mine underground development is proceeding and some high-grade ore being opened up. Progress is being made with construction of a mill. The site has been made ready and materials for the building are being assembled.

Goldale.

Exploration of the properties of the Goldale Mining Company at Porcupine is underway. This company has several claims east of the McIntyre and the work now being done may result in important discoveries. Mr. H. Poirier is in charge of operations.

Other Gold Areas.

Gold has been found in many parts of Northern Ontario and in several areas there are properties which are likely to add considerably to the Province's gold output. These properties are in various stages of development and have been handicapped by adverse conditions which are gradually disappearing. War and the period of high prices for supplies and labor made development of gold properties unattractive. Now the increasing purchasing power of gold is increasing the possibilities of the, as yet, unproductive mines. A further impetus to gold-mine development is the prospect of the provision of better transportation facilities for several of the promising areas. Conditions having changed for the better, it is probable that the search for gold will result in important developments during the coming year in several areas in Northern Ontario.

Porcupine Crown.

Search for new orebodies is proceeding at the Porcupine Crown. This mine was profitably operated for some time, but is not at present productive. It is planned to do more underground exploration before resuming mill operations.

NORTHERN ONTARIO AS SOURCE OF PLACER GOLD IN INDIANA.

Indiania State Geologist in 1902 Forecasted Northern Gold Occurrences.

By C. HAFER (From "Engineering and Mining Journal").

Some months ago, at a meeting of the Canadian Mining Institute, the question arose as to the whereabouts of the placers from erosion of the Ontario gold veins.* Without knowing anything of Ontario gold deposits, either in place or fragmental, I am inclined to believe that they may have been removed during the glacial period, scattered over the drift-covered area of the interior northern states, and, in some places concentrated, forming placers of sufficient richness to suggest near-by gold veins and affording a field of effort to the inexperienced.

Among numerous localities where gold has been found in the drift-covered region, the most important is probably Indiana. Little known to miners throughout the world, this field has awakened considerable interest in the Middle West, and has been the scene of activity, at intervals, with little profitable result, as far as I know. In 1901-02 I spent part of the two summers there panning and testing the deposits with a sluice box. The counties of Brown and Morgan, lying forty to sixty miles southwest of Indianapolis, are the ones most prospected for gold, though there are a number of others from which gold has been reported.

In Morgan County, the surface features are typical of the Middle West, in general flat, with valleys carved by streams. No igneous or metamorphic rocks are known to exist here, and certainly none are visible in place. The placers have been satisfactorily determined to be of glacial origin, as a result of the investigation of a number of geologists, among them glacial specialists in the Government employ.

It is evident to the miner that the debris he finds below his boxes is not all of local origin, as there are fragments of granite, gneiss, amygdaloid, greenstone and iron ore, and in the riffles one finds pieces of corundum, garnets, and, in addition, an abundance of black sand.

According to the state geologist of Indiana, Blatchley, in his report of 1902, gold was discovered in Morgan County by returned Californian miners in 1850, who observed the characteristic black sand in the ravines and began prospecting. They found gold in the tributaries of Sycamore and Lambs creeks, and some were able to recover two to three dollars per day for several weeks. Numerous fortune hunters were attracted, and the pay dirt was washed out in a short time, when the boom subsided. Since that time washing has been carried on by a few workers, with pan and rocker, in Brown and Morgan counties, with a total production, estimated in 1874, at $10,000 and since then probably doubled. The largest nugget recorded is of 132 grains, valued at $5.50. The silver content is small, a mint report of July 12, 1901, making return of 61c. for silver in 14.05 oz., $250.07 being the total amount of the return.

In 1902 we washed only ten yards of dirt, with a recovery of $2.50 in the boxes, when the water supply gave out, and with the gold pan we tested the little valley in which the work was carried on, finding nothing more to attract us. The gravel stratum above bed rock here was largely of the country rock, with little of the foreign wash. On Gold Creek, to the northeast, there were more foreign boulders, and apparently better and heavier values. All of the gold found was flat and well polished, indicating the long journey to its present resting place.

It is interesting to note that several diamonds of value have been found in this gold field. Mr. Blatchley mentions having seen eight, ranging in weight from one eighth of a carat to four and seven-eighths carats.

The conclusion of Mr. Blatchley, in his 1902 report, was that the original home of the gold and diamonds was in the neighborhood of James Bay, in Canada, and he ends with the following, suggestive of prophecy: "It is not improbable that within the next quarter century, a new Eldorado will be discovered among the igneous rocks of this Far Northern region, which will be as rich in gold and precious stones as any heretofore known to man." The discoveries made in Ontario since that report was made seem in a measure a fulfillment of that forecast.

*Note.—"Lost Placers of Ontario, Dr. A. P. Coleman, Toronto meeting C.I.M. & M., 1920. See C. M. Journal, page 221, issue 19th March, 1920."

PERSONALS.

The President of the Algoma Steel Corporation announces that Mr. S. V. McLeod is appointed Purchasing Agent of the Algoma Steel Corporation, Limited, with headquarters at Sault Ste. Marie, Ontario, vice Mr. L. L. Jacobs, resigned, effective 1st July.

Mr. Frederick F. Sharpless has been selected to succeed Mr. Bradley Stoughton as secretary of the American Institute of Mining and Metallurgical Engineers. Mr. Sharpless is at present secretary of the Mining and Metallurgical Society of America. He is a gradnate of the University of Michigan and was for five years Professor of Metallurgy at the Michigan College of Mines.

Mr. C. F. Rand of New York has been elected an honorary member of the Iron and Steel Institute, London. Mr. Rand, who is prominent in the Cuban iron industry, is a past president of the A.I.M.M.E.

Dr. J. J. O'Neill, who is at present in the Mackenzie River oilfield, has been appointed to fill Dr. J. A. Bancroft's place on the geological staff of McGill, during the latter's absence on leave.

Mr. N. F. Dye, manager of Northcliff mine, is in Toronto, on his way to Buffalo. The Northcliff mining company is developing a silver property at Gowganda.

Mr. A. J. Daimpre is in charge of development work at the Murphy gold property, Goudreau, Ont., recently acquired by Toronto interests.

Mr. Kirby Thomas of New York is in Toronto on his way south after a visit to the Gowganda silver district.

Mr. George Carson has opened a customs assay office at Porcupine. Mr. Carson was formerly on the staff of Northerown Mines.

Mr. S. Evans, Chairman of the Crown Mines, Ltd., of South Africa, predicting a coming demand for gold, recently said: "That means it is within the bounds of possibility that the time may yet come when the Crown mines will find it profitable to start again at the outcrop, and mine three penny weight reef".

Northern Ontario Letter

THE SILVER MINES.

The Cobalt Field.

News that the coinage of silver is to be resumed in Russia on September 1st is an indication that sooner or later there may be a general tendency in this direction among the leading nations. Currency without metallic backing has received widespread condemnation, and precious-metal coins promise to find increasing favor from this date forward. Any new demand added to the silver requirements through regular channels seems almost certain to increase the quotations for commercial bar-silver. With this belief in mind, some of the leading operators in the Cobalt district are holding a large reserve of silver bullion in their vaults. This is particularly true of the Nipissing and the Mining Corporation of Canada. The latter company has not shipped any silver in quantity since the beginning of the year, the president J. P. Watson, explaining the situation thus:

"Since the first of the year, we have refrained from selling silver in quantity, owing to the continuing low price, and we are carrying about 650,000 ounces. To offset the loss of interest we would otherwise make, we have been selling spot silver in London at a premium over forward purchases of the same quantity which, without any risk to the corporation, enables us to earn interest on the value of the silver sold and a small profit besides."

For the fiscal year ended Feb. 28, the Beaver Consolidated Mines, Ltd., showed a deficit of $3,617.38. This was attributed to a shortage of labor during the first half of the year, together with a power shortage during the last half of the period, as well as a rapid decline in the price of silver which caused the mine to close on Dec. 31. In his annual statement to the shareholders, F. L. Culver, president of the Beaver, makes the following comment, a summary of the report itself having been presented to the readers of the Journal last week:—

"No new ore bodies were developed during the year on the upper levels, but on the 1400-foot level, driving on the vein which had previousy been encountered at this depth and on into the Prince Davis property, of which we hold a lease, the formation is very strong and well mineralized.

The shortage of power and labor were serious factors in the year's operations, not only enrtailing production and development, but in conjunction with the drop in the price of silver forcing us to finally close the property on December 31, 1920, as we cannot profitably mine the product at present low prices. The mine is being kept pumped out ready for a resumption of operations when conditions become normal.

We would direct your attention to the report of the Kirkland Lake Gold Mining Company, Limited. With the large stock of holdings of Beaver Consolidate Mines, Limited, in the Kirkland Lake Gold Mining Company, Limited, together with the notes held for advances made by it to the latter company for the development of its property and the erection of a mill thereon, Beaver's interest is transferred temporarily to the production of gold. Your directorate, however, are confident in the belief that the throes of world reconstruction are already fast passing, and that with the return of normal conditions, general business will experience an unprecedented revival, bringing an important and enduring demand for silver for use both in coinage and in the arts."

A feature of the affairs of the Beaver is that the company paid $371,519.66 for the stock of the Kirkland Lake Mining Company and has advanced an additional $421,881.34 to develop and equip the mine, thus representing an investment of $793,401.00.

The Coniagas mine is treating upwards of 600 tons daily, made up of run-of-mine ore, slimes and sand tailings. The average grade is understood to be under eight ounces per ton, and the company is realizing a satisfactory profit. This represents one of the most efficient operations in the district.

Advice from South Lorrain tends to indicate that good results are obtaining on the Keeley and the Haileybury Frontier. The Keeley is produeing not far under $1,000 a day, while on the Haileybury Frontier an encouraging amount of high-grade ore is being encountered. It is also learned that the Lang-Caswell property in Lorrain is being de-watered with a view to having it thoroughly sampled. This is one of the properties which became forfeited last Fall, following the general cancellation of claims on which certain provincial taxes had not been paid.

Elk Lake and Gowganda.

Considerable interest is centering about the proposed construction of a light narrow-gauge railway, the details about which have been presented from time to time in this letter. As to the present situation, there seems to be some doubt. The "Globe," Toronto, carried the following note a few days ago:—"The proposed light railway from Swastika into the mining districts of the Montreal River and Larder Lake was taken under consideration by the Government-in-Council. It is understood that the project is not favored by the Drury Cabinet and that it is improbable that the line will be backed by the Government."

The plan of the promoters of the Northern Light Railway Company was to sell $1,850,000 worth of bonds, $1,500,000 to be sold privately and $350,000 to be taken up by the Government. It has been noted that a good many owners of property along the proposed route of the line have not shown much enthusiasm in connection with the scheme. The chief objection heard is in connection with the line being narrow gauge and thereby necessitating the trans-shipment of freight at junction points.

In view of the report that the Ontario Government may refuse to back the project, it would be difficult at this time to hazard an opinion as to what the promoters will do. This, presumably, will depend largely upon the measure of success being met with in connection with the private sale of bonds. One thing is certain, and that is that F. L. Culver, president, and Col. R. P. Rogers, construction manager, were both very optimistic recently with respect to the outlook.

THE GOLD MINES.

The Porcupine Disrict.

Current gold output from the gold mines of Porcupine and Kirkland Lake is at the rate of $1,350,000, amounting to a rate of $4,050,000 quarterly. This compares with a production of $2,953,036 for the first quarter of the year according to figures issued by the Ontario Bureau of Mines, and compares with a preliminary estimate of $3,734,345 for the second quarter

of the year by the correspondent of the Journal.

The increase in tonnage planned at the mines would encourage the belief that production may increase to a rate of close to $1,500,000 a month by the end of the current year, and may approach $2,000,000 a month during the Summer of 1922.

J. P. Bickell, president of the McIntyre-Porcupine is quoted in the press stating that the McIntyre-Porcupine and the Temiskaming Mining Company have lost a total of around $100,000 as a result of their first year in the coal business in Alberta. These companies took over the Blue Diamond coal mine about a year ago, at which time, very glowing remarks were made by officials. In the meantime, the Temiskaming mine is itself not producing any revenue, while the loss on the Blue Diamond coal-mine, together with the salary of $35,000 a year which the McIntyre and the Temiskaming are paying J. P. Bickell, is equal to nearly two month's net profit on the McIntyre in spite of that company producing $2,000,000 a year in gold.

Mill heads continue to run high at the Dome Mines, the ore from the lower levels being about fifty per cent richer than was the average in the upper levels. This is placing the Dome in a strong physical condition, and the treasury is steadily increasing. Provided no unforeseen difficulties arise in connection with labor or hydro-electric power during the coming fall and winter, it is believed the Dome directors will be favorably disposed and in a position to commence making a capital reduction about the end of this year, or early in the new year.

Work is proceeding on the North Davidson property, situated in the north-eastern part of the township of Tisdale. The work is being done under contract, and very encouraging results are reported, although there are no details available.

Kirkland Lake Field.

Interest does not appear to be very keen in Kirkland Lake over the question of building a light, narrow-gauge railway through his field.

The Ontario-Kirkland is proceeding with work in connection with construction of its mill. This company hopes to join the producers some time during the last quarter of the current year. Underground work has placed a substantial quantity of ore in sight, some of which runs about $18 to the ton, and with likelihood of mill heads averaging upwards of $12 a ton.

The new mill on the Wright-Hargreaves is giving extremely high efficiency, and mill heads are high, the average so far being not far under the Lake Shore. For the time being, the ore is coming largely from development work, and heads tend to fluctuate. This policy will be followed for a number of months, during the time stopes are being opened and work advanced far enough to regulate the grade of the ore going to the mill.

Fire destroyed one-and-a-half-miles of power-transmission line at the Associated Goldfields during the past week. This caused a few days' delay in work on the Argonaut property which draws power from Larder Lake. It is officially announced however, that work is again in full swing at the Argonaut, and is being centered at the 350-ft. level. The downward continuation of the main ore-body has been encountered at this horizon, and the values are such as makes the ore of commercial grade.

Shareholders of the Goldfields, Ltd., of Larder Lake, have become so aroused over the schme of the Associated Goldfields to merge various properties into one 30,000,000 share concern on terms not favorable to Goldfields, Limited, that a Protective Committee has been appointed for the purpose of taking legal proceedings to prevent the scheme going through.

The Protective Committee consists of John Keating and Hugh I. McNiel, of Oakville, together with P. Kirkegaard, of Toronto, which committee has just addressed the following letter to the shareholders of the Goldfields, Limited:—

"At a recent meeting of a number of shareholders of Goldfields, Limited, we were appointed a committee for the protection of shareholders' interests.

"For many years the shareholders of the company were not informed of the affairs of the company—no meetings of the shareholders were held and even the annual returns to the Government were not made.

"The properties in which the company was interested were operated, but no return was made to the shareholders.

"Another company, under the name of the Associated Goldfields, Ltd., was promoted by the persons in charge of the affairs of your company, and apparently was operated in close connection with Goldfields, Ltd. The shareholders have never been advised of the relations that existed between these companies or as to the manner in which your affairs were carried on.

"Recently, a third company has been promoted by the same interests, under the name of Canadian Associated Goldfields, with an authorized capital of $30,000,000.

"It is the intention of the persons who have been in charge throughout to transfer the assets of Goldfields, Ltd., to this new company on a basis that will give the stockholders of Goldfields, Ltd., only one share in the capital stock of the new $30,000,000 company in exchange for four shares of Goldfields, Ltd. At the same time the shareholders of Associated Goldfields, Ltd., are to be taken in on a basis of share for share in the new company.

It is the belief of a number of shareholders of Goldfields, Ltd., that the only properties of real value that the new company will control will be those heretofore controlled by your company, Goldfields, Ltd., and that the present transaction is of the same character as the transactions of past years and that the properties of your company are to be exploited to the advantage of Associated Goldfields and Canadian Associated Goldfields.

"It is the opinion of a number of shareholders that the transaction practically amounts to a confiscation of your interests.

"Under these circumstances a committee has been appointed, and propose to take such steps as may seem advisable for obtaining full information as to the past dealings with the properties of the Goldfields, Ltd., and to secure adequate return to the shareholders or in the alternative to have the proposed transaction set aside. Legal proceedings will be necessary for this purpose.

"In order to provide necessary funds we propose that any shareholder who approves of the proposed steps to be taken should contribute one cent for each share held by him, or at the rate of $10.00 for every 1000 shares of Goldfields, Ltd. Cheques may be made payable to the order of Goldfields, Limited, Protective Committee.

"We also request that you sign and return the enclosed authority.

TORONTO MINING QUOTATIONS.

Quotations on Active Stocks on Standard Stock Exchange for Week Ending 9th July, 1921.

	High	Low	Last
SILVER			
Adanac Silver Mines, Ltd. ..	1	1	1½
Beaver Consolidated	30	29	29
Chambers-Ferland	5	5	5
Crown Reserve	8	7½	8
McKin.-Dar.-Savage	18	18	18
Mining Corp. of Can.	1.15	1.04	1.15
Peoples Silver Mines	4¼	4¼	4¼
Temiskaming	20½	20	
Trethewey	13	12	12½
GOLD.			
Atlas	22½	21	
Dome Extension	75	75	75
Dome Lake	4¼	4¼	4¼
Dome Mines	19.80	19.80	19.80
Gold Reef	2½	2½	2½
Hollinger Cons.	7.12	7.10	7.12
Hunton Kirkland G. M.	7	7	7
Inspiration	3	3	3
Keora	10½	10	10½
Kirkland Lake	37½	35	
Lake Shore M. Ltd.	1.18	1.14	
McIntyre	1.90	1.85	
Moneta	8	8	8
Newray Mines, Ltd.	4½	4¼	
Porcupine Crown	13½	13	13
Porcupine V. N. T.	16½	16	16
Preston East Dome	2⅜	2¼	
Schumacher	22	21½	22
So. Keora	19	17¾	19
Teck-Hughes	12	10½	10½
Thompson Krist	5	4⅜	4⅜
West Dome	6	5¾	6
Wasapika Con.	8	7	7⅜
OILS.			
Petrol Oil	24½	24½	24½
Rockwood Oil, Gas	1¾	1¼	1¼
Vacuum G.	7½	6	6

TORONTO COAL PRICES.

Toronto, 13th July. — Last week it was intimated, in this column, that a stiffening in the price of slack coal was liable to take place pretty soon. It has already occurred. Slack coal has now advanced from ten to twenty-five cents a ton. The consumer does not yet realize that there has been a stiffening in price and that there is a possibility that this will go further. Anthracite prices are unchanged. The 1½ per cent Pennsylvania State tax on the price of the coal at the mines, which became effective on the 1st of this month, was not applied to the price of the coal to the consumer — that is to say, the producing companies absorbed the tax.

The public are still holding off from purchasing anthracite, with the result that, all through the Province of Ontario, dealers are very heavily stocked with anthracite. The householder is not buying his winter coal. In many cases he cannot. For example, in Toronto, with large numbers unemployed, and with still larger numbers working only part time, money is not too plentiful with very many householders. Then, again, the housing situation is operating detrimentally on the ordering of anthracite by householders. Many of them are uncertain whether they will be in their present abodes over the winter. If rents fall, as there is some tentative indications that they may, well and good. But, if they do not fall, then large numbers of householders will have to get out of their present dwellings, and join with others in the expedient known as "doubling up". Finally, back of the minds of very many who are refraining from getting in their winter coal, is the idea that prices will be lower in consequence of reduced freight rates. This idea will, most probably, prove fallacious. But, whatever the reason for the public's attitude in holding off from buying anthracite, it is creating a serious situation for many of the retailers in the Province. Many of them are very heavily burdened with the amount of coal they are being forced to carry. They cannot afford to carry it, either from a financial standpoint or from that of the physical space at their disposal. Speaking generally, unless the Ontario retailer has something like a tolerably equal distribution throughout the year, he is "up against it".

With regard to bituminous coal, here, again, the depressed conditions of industry are adversely affecting the situation. Industrial concerns are purchasing only in small quantities — and this though they had been warned that every day's delay, from now on, in purchasing in bulk, is likely to add to the price they will have to pay when they do make up their mind to purchase. Had the demand, which was expected, occurred on or about the 1st June, production could have been speeded up to meet all requirements. But now there are likely to be grave difficulties in doing so. There is need for the railroads and other utilities, both public and private, to purchase in larger quantities than they are doing. In this connection, it is noteworthy that Mr. Edgar E. Clarke, chairman of the Interstate Commerce Commission in the United States, has written to public utilities operating in that country, urging them to start all the coal they can now. The effects of this letter are already noticeable in the resumption of shipments to the New England States.

METAL QUOTATIONS.

Following are the fair average prices for ingot metals (in less than car-loads).

Montreal.	Cents per lb. July 6th	July 13th
Copper, electric	17¾	17¾
Copper, casting	17½	17¼
Tin	36½	35½
Lead	6½	6½
Zinc	7¼	7
Aluminum	31	31
Antimony	7¼	7¼

Toronto.	Cents per lb. July 13th.
Copper, electric	17
Copper, casting	16¾
Tin	38
Lead	7
Zinc	7½
Aluminum	30
Antimony	9

(Unchanged since last week.)

Bidgood Gold Mines Ltd.

According to the "Northern Miner" operations at the Bidgood mine in Label township have been very successful and since operations were resumed a few weeks ago even greater success has been enjoyed.

Temiskaming Testing Laboratories.

On July 1st the Ontario Department of Mines took over the Temiskaming Testing Laboratories from the T. & N. O. Railway Commission. Test runs of ore can be carried on at this plant at very moderate cost.

American Matatchewan Gold Mines.

The American Matatchewan company is developing its claims in the Matatchewan gold area. Mr. J. H. Dixon who recently visited the property is interested also in the Lake Matatchewan property on which work is to commence soon.

Gowganda.

Recent travelers over the Gowganda road report that a number of men and teams are at work and that the road is in better shape than usual. Improvement of the road would greatly benefit those who are developing properties in Gowganda district.

Kirkland Lake Gold Mines.

During the past year Kirkland Lake Gold Mines Ltd. treated 45,478 tons of ore. Shortage of labor and power retarded development.

Of developments at the 900-ft. level President F. L. Culver says: "After cutting to the ore zone at the 900-ft. level we have done 409-ft. of drifting encounting several bodies of rich ore." The drift at the 900-ft. level will soon be under the Central shaft. It is proposed to raise to the 700-ft. level with the intention of having this shaft open from surface too 900-ft. as soon as possible. This shaft is now 520-ft. deep.

Earnings for the year were $313,210 and charges $278,211 leaving a profit on operations of $34,900 which provided for interest on notes $32,579. Profit and Loss account shows an adverse balance of $11,081 for the year.

The largest single item in mine operation costs is labor. It is probable that the $750,000,000 spent iby Ontario metal mines at least $250,000,000 was paid for labor employed in Ontario. While some part of the remaining $500,000,000 went out of Ontario for equipment and supplies the greater part was spent for supplies purchased in Ontario.

British Columbia Notes

Stewart, B.C.

A considerable body of gold-silver-copper ore is reported to have been opened up on the Fitzgerald Group of Mineral Claims, Bear River Valley. An assay return of $32 to the ton has been secured from a sample taken from near the surface. The vein has been uncovered for a width of 100 feet.

Anyox, B.C.

The slump in the market quotations on copper has affected Canadian production less than it has that of the United States. Today the Canadian production is 52 per cent that of the 1920 total at the same time while the output of the United States is figured at 20 per cent that of 1920. In 1920 the United States produced 36,000,000 lbs. of copper monthly while Canada produced 4,600,000 lbs. Practically the whole of the Canadian production came from British Columbia, the output of Ontario being confined to that obtained as a by-product to nickel. The Granby Consolidated Mining & Smelting Co. is reported to have had the biggest month of its history in point of production in May. The output ran to 91,000 lbs. The recent fall in the market, following signs of a rally, has again started speculation as to the immediate future of the Industry in this province. It is possible that a further decline of a point or two would mean the closing down of the Anyox Plant although it is explained by the Company management that this would be done as a last resort. There are 1,150 men employed at the smelter centre at present and a considerable number at the Cassidy (Vancouver Island) Collieries which are operated by the same company and from which coal is secured for industrial uses at Anyox.

Smithers, B.C.

Development work is to be resumed on the Babine Bonanza Group, Babine Mountains, by James Cronin, the well-known British Columbian mining man. Last year he ran a long tunnel that tapped the vein some 350 feet below his former workings and over 1,000 feet below the apex of the hill. He did some development work on the vein but the advent of snow, and general weather conditions, forced the closing down of the work. It is his intention to carry on until a shipping proposition of considerable proportions is proven or otherwise. He is confident of success.

Trail, B.C.

Ore shipments in gross tons at the Trail Smelter of the Consolidated Mining & Smelting Co. for the week ending June 21st totalled 6,476 tons. The bulk of this, some 6,237 tons came from the company's mines. The Florence Mine, Princess Ck., contributed 102 tons; the Knob Hill, Republic, Wn., 50 tons; and the Surprise, Republic, 87 tons.

Trout Lake, B.C.

The snow is leaving the mountains a month earlier this year than is usual and a number of engineers are expected in the district to inspect various properties on behalf of outside interests. Among those to be examined are several belonging to Mrs. A. Jowett, who brought out some fine gold-bearing samples a few months ago. It is possible that there will be a revival of interest in placer mining. Dan Savoy, a veteran prospector, who has returned after an absence of twenty-five years in the Klondike and Alaska, is making tests along the Lardeau. If the results are as good as is expected a company will be formed to exploit the placers of the Lardeau and its tributaries.

Kitchener, B.C.

The Leadville Group of silver-lead claims, situated at the junction of Goat River and Leadville Creek, is being thoroughly explored. Iron ore claims, located on Iron Mountain, and owned by C. P. Hill, of Montreal and associates, are to be prospected this summer. The crew already has left to do the work. A tunnel is being driven on the Sullivan-Larsen Copper Claims with a view to striking the vein at depth.

Nelson, B.C.

The difficulty of identifying mineral ground held by Crown Grant and otherwise in some of the districts of British Columbia was discussed recently by the B. C. Prospectors' Association. Considerable areas, it was contended, should be re-surveyed, permanent location posts planted, and maps prepared on a scale of 1,500 feet to the inch showing all important rivers, creeks and other topographic features mentioned in the original field notes. It is argued that forest fires, and the natural destructive agencies of nature, have obliterated signs and notices of original prospectors and mining men to such an extent that the present prospectors is totally at a loss in efforts to obtain his bearings. Therefore it is said to be in the interests of mining that the provincial government take the steps necessary to improve field conditions in mineral bearing zones. Representations to this effect are to be made to the proper authorities.

Prince George, B.C.

The North Point Mining Co. is developing a promising silver-lead-gold property situated near Hudson Spur on the Fraser River and near the Grand Trunk Pacific Ry. Recent tunnel work is reported to have cut an 8-foot lead showing good assays. The main tunnel now in 350 feet is expected to strike the principal vein at about 600 feet.

Greenwood, B.C.

The Providence Mine has made its first shipment of the year to the Trail Smelter and is expected to continue such shipments regularly.

Grand Forks, B.C.

The Horn Silver Mine, Similkameen, has been acquired by Herbert Powell. Shipments have been made this year to the Trail Smelter. It is probable that Mr. Powell will endeavor to interest capital with a view to the installation of a small plant.

Edmonton, Alberta.

The gold rush into the Peace River District, to which reference has been previously made, has proved to be a "false alarm." The stampeders did not obtain results warranting any special enthusiasm.

Victoria, B.C.

Four parties have been outfitted by the Geological Branch of the Dominion Department of Mines to investigate the oil and other resources of the Mackenzie River region. Dr. D. B. Dowling, Dr. G. S. Hume, Dr. M. Y. Williams and Mr. E. J. Whittaker are in charge of the parties.

Forty-nine sections of tar sand lands along the banks of the Athabaska River have been withdrawn from location by the Dominion Government. Theses comprise all the known occurrences of tar sand not already alienated.

EDITORIAL

ELBOW LAKE PLACER STAKING.

Mr. J. P. Gordon's letter in this issue gives information on a curious complication that has arisen at Elbow Lake, Man., subsequent to the recent discoveries of gold at this point, regarding which Mr. Gordon gave interesting particulars in the last issue of the "Journal".

Regulations covering the staking and mining of placer-gold deposits could not have had in mind such adventitious and local accumulations of displaced lode-gold as could take form in a recently glaciated lake of the "Rocky lake" type, typical of the pre-Cambrian rock exposures of Northern Manitoba. It must lead to grave complications if grants of placer claims are given in such localities, as they can serve no useful purpose to those who take out the claims, and will operate only to hinder the extraction of such gold as is present in the rocks. It is to be expected that any important yield of gold from this district will be taken from deposits of lode type, and the local conditions are so little adapted to the formation of important placers that their occurrence would be a surprising discovery.

THE COMING INSTITUTE MEETING AT EDMONTON.

We are informed by Mr. T. B. Williams, the Convention Secretary of the Annual Western Meeting of the Canadian Institute of Mining & Metallurgy, which is to be held at Edmonton from the 14th to the 16th of September, that it is proposed to make this meeting one of the best in the history of the Institute. A tentative programme of the proceedings is published in this issue. The Secretary of the Institute, who is soon to return to headquarters from his going to and fro in the land, has, if we may judge by his advocacy of the use of western coal in Northern Ontario, come back impressed by the coal industry of the West and the hospitality of the brethren, and will doubtless do his best to enlarge the attendance of eastern members at the Edmonton gathering. As the coal-bucket, the oil well and the granary of the Dominion, Alberta is destined to bulk more and more in importance in industry, and as recent events have indicated, in political influence. Alberta has that combination of circumstances which Jevons postulates as causative of great industrial eminence and density of population, namely, an agricultural community with capital accumulations and widespread education possessed of great accumulations of bituminous coal.

Alberta has also distinguished itself by selecting scientific men to advise and direct its mineral development, and it has put university training in the forefront of industry. If it continues this wise course, and at this early stage of the coal industry will make provision for the small statutory impost on coal production that would be required to permanently endow coal-mining education and research in the Province, Alberta can and will become the pillar and base of Canada's industrial future.

ASBESTOS FABRICATION IN CANADA.

Our well-informed contemporary, "Asbestos" of Philadelphia, expresses itself as "utterly confounded" at the opinion expressed in this column in our issue of 27th May that "the spectacle of one of the largest and "most experienced asbestos companies in Britain build-"ing a factory to utilise Canadian asbestos in the "United States is not one that the Province of Quebec "can be expected to view with equanimity". The further remarks of our contemporary are quoted elsewhere in this issue in full, and it will be noted it is assumed that, if British fabricators of asbestos fibre were forced by high import tariff imposed by the United States to erect manufactories in the United States, they would utilise South African asbestos, and would consume "as little Canadian raw asbestos as would be absolutely necessary." The likelihood that South African asbestos would be used by British manufacturers in the United States in competition against Canadian asbestos seems rather remote, but it is not of course impossible. Our objection, however, was based on the assumption that such a British manufacturer would use Canadian asbestos—as is most likely—and it would be distinctly distasteful to Canadians to hear that British capital was being invested in the fabrication of Canadian mined asbestos fibre in a new factory in the United States, seeing that for many years there has been a very clearly defined desire in the Province of Quebec that some portion, at least sufficient to sup-

ply the Canadian market, of the profitable business of fabricating this unique domestic product should be located within the Dominion. Any proposal of a British manufacturer to erect a factory in Canada to utilise asbestos mined outside of this country would probably be dealt with here as such matters are now being dealt with in the United States, namely by the imposition of a protective tariff sufficient to make its importation unprofitable.

To put the matter baldly, the people of Quebec know that they mine 80 percent of the commercial asbestos of the world, and they know that Canadian asbestos is of first class quality and will always be in good demand. They also know that while the total revenue from asbestos sales is approximately ten million dollars annually the business of fabrication will run into ten times that annual turnover. It is recognised that asbestos fabrication is largely a matter of assembly of asbestos with other raw materials, and that the market available in the United States has made possible the present development of the asbestos-mining industry in Canada. Admitting all this, however, it has always been felt as somewhat of a reproach upon Canadian business enterprise that almost all Canadian asbestos should be shipped out of the country merely as prepared fibre, by virtually as a mine concentrate, and should undergo all further elaboration by labour and capital expended in other countries.

It may be quite correct, such is the unfortunate complexity of our Canadian situation, that a high import tariff in the United States is necessary to protect industry in that country from European competition under existing exchange rates, but when such an industry is based on a supply of raw material mined in Canada, and the import tariff is directed chiefly at Britain, it is seen that Canada, like Agag, has need to walk delicately.

Notwithstanding this complex situation, however, there is good reason to believe that Canada's anomalous — not to say subordinate position—in regard to asbestos fabrication will gradually right itself, and that Canadian asbestos miners, as their financial abilities will allow, will little by little develop fabrication plants and the utilisation of the by-products of asbestos mining, and will not be always content to be miners only.

Perhaps we might also explain, in response to the courteous comment of our Philadelphia friends, that the views of the "Canadian Mining Journal" are possibly a little in advance of the quickly-passing, present-day phase of Canadian status, and have in mind that in regard to many things, and particularly in regard to mineral policies, Canadian business is only nascent. We have attempted to indicate tendencies of the future rather than to find fault with the things that are accomplished.

THAT "SIXTY MILLION DOLLAR" YARN.

A Canadian Press despatch from Ottawa, under date of June 13th, quoted Dr. Ami, as Acting Governor of the Imperial Mineral Resources Bureau and Technical Adviser to the Canadian High Commissioner as stating "that probably $60,000,000 worth of platinum metals had been lost to Canada annually for 25 years past." This statement, which on its face was erroneous, gained wide circulation and credence, as was to be expected from its credited origin and its publication by the Canadian Press. No definite correction of the report has come to our notice, although the newspapers that printed the original statement later modified it to the extent of stating that the loss of sixty million dollars mentioned was not an annual occurrence, but was the estimated cumulative loss since the beginning of extraction and treatment of the Sudbury nickel-copper ores. Lies die hard, however, and the Montreal "Gazette" for July 18th states: "Canada has during the past 25 years lost sixty million dollars annually through failure to segregate properly platinum and other precious metals found in Northern Ontario." This false and damaging report will circulate in the British and foreign press for years, until by dint of repetition it will become an article of popular belief, as other equally inaccurate and unfair stories about Northern Ontario have already become.

The value of the precious metals in the Sudbury ores are estimated as being from 75 cents to a dollar per ton in value, the last-named figure being an ideal maximum content. The total ore reserves in the Sudbury district are estimated at roughly sixty million tons, so that it would have been necessary, had the first-published statement been correct, to mine all the ore in the district, and totally recover all its precious metals, in one year.

It is a rare thing in economic metallurgy to recover all the valuable metals that laboratory analysis of an ore indicates that it contains. It may be emphatically stated that the chemist-metallurgist made possible the recovery of precious metals from the Sudbury ores, and not the precious metals only, but the copper and the nickel for which the ore deposits are primarily and chiefly exploited, and by doing so made the mining of the ore a commercial success. The recovery of gold and silver from the Sudbury ores was not a difficult metallurgical feat, and such recovery has been virtually complete, but the recovery of the platinum group of metals has been a problem that has been slowly solved. Moreover the theoretical value of the contents of an ore does not represent the recoverable value, as it has often occurred that the cost of recovery would amount to more than the sale value of the products recovered. For example, a certain well-known iron-ore, of which many millions of tons have been used in Canada, contains an appreciable percentage of rare metals, but no one has yet suggested a feasible plan of recovery. It would be just as fair to state that the companies using this iron-ore were annually throwing away on the slag dumps a substantial sum of money, which could be accurately and

impressively calculated in dollars and cents—if the practical questions of recovery were ignored.

The nickel companies have been accused of many sins, most of which were as airily conceived and had as little real basis in fact as the throwing away of sixty million dollars annually. One newspaper that was in the habit of going for the nickel companies every little while accused them of omitting to recover polonium from the Sudbury ores. There is no limit to the imaginary contents and values of a complex ore, as perusal of prospectuses will show, but there is a very distinct limit to their economic recovery. But while those who are conversant with these matters are able to assess the value of a "news" item and pass it by with faint amusement, the general reading public is unable to detect what is false. The C.I.M. & M. Bulletin pertinently remarks in this connection: "Here was a colossal waste, " and since the metals of the platinum group 'might' " have been recovered, the obvious inference to be " drawn was that those in charge of the mining and " metallurgical operations have been negligent, either " wilfully, for some unexplained reason, or through " ignorance and stupidity. In either case, the profes- " sion is brought into contempt, or worse, and mining " gets the reputation of being either a swindle or a " gamble. . .the power of the Press to do harm is not " one iota less than its power to do good."

We do not believe Dr. Ami authorised for publication the unqualified statement that was credited to him.

THE NEW U. S. TARIFF.

The tariff bill reported by the Ways and Means Committee at Washington on June 30th contains many items of interest to those producing minerals. The Washington correspondent of the "Engineering and Mining Journal" predicts that it will pass easily through the House, but that it will arouse considerable discussion in the Senate. The "Mining and Scientific Press" says: that the Bill will be vigorously debated in the House, and it is expected that it will come to a vote within two weeks; it is not expected that there will be any changes in the Bill on the floor of the House.

The Fordney bill contains provisions for duties on a large number of minerals and metals including 75 cents per pound on molybdenum ore or concentrates; five cents per pound on nickel in pigs or ingots and 30 per cent ad valorem on nickel in rods, bars, etc.; five cents per pound on aluminum in crude form and nine cents for aluminum in plates, sheets, etc., ten per cent ad valorem on graphite; $5 per ton on fluorspar for one year and then $4 per ton; six cents per pound on mica plus 17 per cent ad valorem. Imports on lead and zinc ores and products vary according to composition.

The proposed impost of 35 cents per barrel of 42 gallons on crude petroleum has been deleted from the schedule in the House on representations from the President that a protective tariff against imported crude petroleum was inconsistent with the policy of the government of the United States, which he stated in his letter "is doing every consistent thing to encourage the participation of American citizens in the development of the oil resources in many foreign lands."

ANOTHER NICKEL STORY.

The "*Financial Post*" of Toronto reports that Hugo Stinnes is coming to Canada, and "is believed to be definitely after a share of control of the Canadian nickel industry". It is suggested that Stinnes is behind the Norwegian financial people who recently interested themselves in the reorganization of the capitalization of British-American Nickel Corporation. It is further commented: "The position of the British Government in the nickel corporation is the one point that casts doubt upon the theory that Stinnes is in the Company". As a conclusion of these ingenuous surmises, the "*Financial Post*" says: "But it is an open secret that the British Government is anxious to get money out of the company now that the war is over."

To suggest that the British Government would allow a German industrialist to obtain a share in control of a Canadian nickel enterprise to retrieve some paltry millions of war expenditure is equivalent to suggesting that the British Cabinet is composed of idiots with a leaning to high treason, with Canadian ministers as complaisant accomplices.

C. W. BARRON, the publisher of the *Boston News Bureau* and an outstanding publicist in the United States, who was distinguished during the war by his clear understanding of the causes then at issue, is contributing to his Boston paper from European points a series of articles on conditions existing in the several countries of Europe. A late comment, written from London, discusses the coal production conditions in England under the title of "Coal Power Beneath an Empire". In stating that the rate of wages paid to the British coal-miner had gradually receded from 1873 "until in 1914 the British miner ranked with the lowest-paid hand labour in the world", Mr. Barron is very much in error. In the matters of working hours and in wages in 1914 the British coal-miner held a preferred status among British workers, and, politically the unionised miners were the strongest working-class unit in the United Kingdom. In stating that "the best miners went to the front and went down" Mr. Barron has put his finger on the main cause of the decrease and apparent inefficiency in coal production in Britain, and he has singled out a dominant fact in British affairs regarding which there is much inexplicable reticence in the British newspapers and reviews, namely, that the British population has during the war lost its fittest members. A new generation must grow up before Britain can restore her industrial efficiency, because, alas, the efficient ones are dead or maimed. Mr. Barron's concluding statement refers to his own country, and is

the soberest kind of truth. He writes: "In the United States is the supreme power; not because its national debt is less; not because of its wheat fields, its cotton or its pork production; but because it has an equipped capacity to output for many generations 600,000,000 tons of coal per annum, and because more than two-thirds of the world's oil output is now American-owned."

Mr. Barron might have added another 400 million tons to the United States' capacity for coal production without undue exaggeration. He might also have added that the feverish anxiety of the world regarding flowing petroleum at this time is a passing phase, and that as the future generations go by it will more and more be recognised that the stable basis of material power resides in the national possession of bituminous coalfields. There is much public misunderstanding of two entirely separate things, namely the ideal method of fuel combustion and the source of the fuel. Admitted that consumption of oil and gas is technically correct, it will be found, after due consideration, that the most dependable and infinitely the greatest reserve of fuel-oil and gas is the coal that remains ungotten in the earth's crust.

THE position of the United States would seem, under the circumstances, to be fairly comfortable. Commenting in a similar connection, "Mining & Scientific Press" remarks: "Our people control eighty percent of "the oil production of the world, and we ought to be "able to meet others in competition without getting "hot about it...The English-speaking peoples cannot "afford to quarrel over such matters, when issues so "much bigger are at stake. We have been comrades in "arms recently in defence of our civilisation, we have a "common purpose in striving for world peace; our "peoples desire intensely that general disarmament "may be brought about by conference between our "leaders and those of other nations; most of us are "sick of the petty jealousies and mean recriminations "that have followed the successful conclusion of our "war with Germany and her dupes; is all the fine "emotion to be lost in petty spites and commercial ri-"valries? Can we not recapture the vision of the heroic "years but lately past, and once more rise above all "meaner things to a plane of manly goodwill and "friendly competition?"

Thanks, Mr. Rickard, there are a good many millions on both sides the line and across the seven seas among the English-speaking peoples who think just about the way you put it. Unfortunately, however, many, so very many, of those who had that fine vision in the heroic years died because they saw early and clearly, and as a consequence the percentage of malicious malcontents is today much greater and rather less restrained in their utterances.

In national relations, as in industrial efficiency we miss those that died in battle.

CORRESPONDENCE.

The Pas, July 4th, 1921.

The Editor, Mining Journal.

Staking Placer Claims Over Ground Staked Under the Quartz Mining Regulations at Elbow Lake.

Dear Sir,—Since my visit to Elbow lake an unique condition has arisen, caused by "Placer claims" being staked over "Quartz mineral holdings."

The idea of staking claims for placer on Elbow river is ridiculous and the only significance of colors obtained by panning, on the bars, or even coarse gold being found by panning, is to convey the information to the intelligent prospector that a quartz lode, carrying free gold, exists in the district, and that by means of the pan he may follow this displaced gold to its source.

The spectacular gold showing on the "Murray find" is in the river and the striae of the glaciers are well marked on the enclosing rock, so that there has been very little change in the surface since glacial times either from erosion or other causes and it therefore follows that to expect to find an alluvial deposot where the gold is concentrated in commercial qualities is absurd.

Under the present mining regulations the holder of a "lode claim" has no surface rights and it would seem that there is no clause in either the Quartz Mining Act or the Placer Act to hinder a prospector from staking a placer claim on ground that is covered under the lode mine regulations.

Now, the definition of "placers" is. "Placers are deposits resulting from the decomposition and erosion of metal-bearing rocks and the concentration of the metallic fragments in beds where they have been carried by water." This definition would have to be changed to justify the Elbow Lake placer staking, to read as follows: "Placers are deposits that have in any way become displaced from the dyke or vein in which they originated."

With this interpretation a placer prospector would be within his rights in so placing his stakes as to cover the oxidized zone of a mineral lode thereby forcing the lode-holder off the earth, until he, the placerman, had sluiced off the surface concentration.

The staking of placer claims might be looked upon as a joke, but it has its serious side. If the rights of the placer prospectors are acknowledged by the Government and recorded, the double ownership, or rights being vested in separate parties between whom no partnership or business arrangements exists, would certainly tend to keep prospective purchasers away. This staking will probably not occasion any serious phase and should go a long way towards emphasizing the fact that holders of "Lode claims" should be entitled to surface rights. In fact a concentrated effort of all mining interests in Manitoba should be made to get the Dominion Government to re-establish the Crown Grant.

My only excuse for this letter is that the mining game has been kept particularly clean and free from wild-catting in this district and with proper mining legislation may be so kept.

Yours truly,

J. P. GORDON.

PERSONALS.

Mr. A. M. Bateman is at the Alaska properties of the Kennecott Copper Corporation.

Notes on Allanite Deposit at Lac a Baude Champlain Co., Que.

By ROBERT HARVIE.

Published by permission of the Director, Geological Survey, Ottawa.

In October 1919 the writer visited the locality at Lac a Baude which, although noted in various reports as being rich in allanite, had not been examined since the first material determined in the laboratory to be allanite was collected. The chief purpose of the writer's visit was to obtain a supply of the mineral for examination by the Mineralogical Division of the Geological Survey but in view of the possible commercial importance of the deposit the following notes on the means of access and general physical conditions may be of interest.

Lac a Baude is in Normand Township one of the projected but unsurveyed townships in the northwest part of Champlain County, Quebec, in latitude 47° 04′ N. and longitude 73° 19′ W. The mineral locality lies 44 miles due northwest of Grand Mere and at the middle of the top edge of the Three Rivers Map sheet of the Geological Survey. The best available general map of this district is published by the Department of Colonisation, Mines and Fisheries of the Province of Quebec, entitled "Carte d'une Partie de la Vallee du St Maurice," scale 2 miles to 1 inch.

The locality is best reached by way of Grand Piles, the terminus on the St Maurice River of a branch line of the Canadian Pacific Railway. From Grand Piles the trip of 32 miles upstream to Grand Anse may be made by steamboat during the summer season. At Grand Anse wagons are available to cross the 9 mile portage to lake Wessonneau where the Laurentian Club which has under lease the fishing and hunting rights of almost the whole district, maintains a clubhouse. From this point the remainder of the journey at the present time must be made by canoe, the steps being as follows,—lake Wessonneau 5 miles; seven portages in 1¾ miles to Steamboat Rock lake; lake 1½ miles; 9 portages in 2 miles to lake Wakanmekonke; lake 3 miles; portage to occurrence about 2 miles. In view, however, of the number of lumber roads that have been built under similar conditions in nearby districts it seems probable that a wagon road of about 12 miles could be readily built from the clubhouse direct to the deposit, thereby completing connection with the steamer service above mentioned.

An alternative but poorer canoe route starts from Creek des Prairies, a flagstop on the Canadian National Railway 23 miles west of La Tuque, and ascends the Vermillion river and its branch the Pabelognang which is the discharge of Lac a Baude. This route, however, is about 60 miles long and entails 2 portages of 3 and 5 miles each as well as seven others of ½ mile and less, in addition to difficulties due to a heavy current.

The occurrence of allanite was first noted by N. J. Giroux in 1893 while engaged as assistant to R. W. Ellis in the preparation of the Three Rivers map sheet for the Geological Survey.[1]

[1] Geological Survey, Vol. XI, p. 36 J., see also VII, pp. 12 13 R. for brief mineral description.

The writer found for his purpose an abundance of the allanite in a small cliff situated 200 yards east of the end of the portage leading to lake Wakanmekonke and about 50 yards south of the actual trail. Other exposures were not examined. This cliff is about 70 feet long, 20 feet high at one end and 20 at the other Below the cliff huge blocks derived therefrom form a talus about 50 feet high. The actual face is composed of a coarse reddish granite but at one end it may be seen that this granite runs back into the cliff for only about 20 feet, while at the other it is limited top and bottom by a brownish-black hornblend gneiss. It seems evident that the granite has intrusive relations to the adjoining hornblend gneiss with the cliff occurring close to the irregular contact.

Scattered through the granite of the cliff face are tabular crystals of allanite which attain a maximum size of about 6 inches by 4 by 1¼ thick, individuals 3 inches long being quite common. The larger crystals are the centres of very prominent radiating fractures presumably caused by some great difference between the cooling conditions of the mineral and of the parent rock. This feature both assists in identifying the allanite and serves in separating the crytals from the rock. The first specimen collected by Giroux contains 57 per cent of allanite in crystals of 1½ to 2 inches long. The present writer found that although most of the larger crystals occurred singly, there was a tendency for the smaller one to occur in clusters or bunches thus giving rise to the very rich material of the discovery.

The actual proportion of allanite in the granite was not calculated, but is probably not more than 1 percent. and as a mining proposition this proportion might be considered rather small. However, in the space of four hours with the geographical hammer it was found possible to obtain from the more easily reached portions of the cliff alone over 90 pounds of nearly pure allanite. The radiating cracks were found to be of immense service in separating the mineral. In addition to the allanite there are also found occasional large crystals of hornblend which on account of their general resemblance in size and color might prove confusing. However, when bruised with a hammer the hornblend has a greenish color in distinction from the dead black or grey of the allanite.

Note: Allanite is of economic interest as a possible source of cerium, and related metals didymium and lanthanum. Some samples of allanite have been found to carry a little thorium. The most important use of cerium is in the manufacture of pyrophoric alloy, which because of its property of emitting sparks when scratched has been largely used for ignition purposes, as in pocket-lighters. During the war the United States Army was supplied with such lighters which created an unusual demand for cerium. Ferrocerium is an active deoxidizer, and papers read before the American Electrochemical Society have suggested its use as a "scavenger" in iron and steel mixtures.

Asbestos Manufacture in Canada

The Action Of The Canadian Johns-Manville Company, Ltd. In Erecting A Manufacturing Plant In This Country Is A Departure Fraught With Great Possibilities.

By A. R. R. JONES.

The Canadian Johns-Manville Company, Ltd., which, some while ago, placed contracts for a large manufacturing plant to be located at Asbestos, in the Province of Quebec, is making very satisfactory progress with the carrying-out of this work. The grading has been done, and the steel for construction work has just about arrived by this time. It is hoped that the plant, where all classes of asbestos products, including asbestos paper, asbestos roofing, asbestos shingles, packings, pipe coverings, asbestos textiles, brake band lining, and so forth, will be manufactured, will be completed by next October. On its completion, manufacturing operations will be at once commenced. At least 100 persons will be employed in the plant, to begin with.

Pioneer On A Big Scale.

Attention has frequently been drawn to the anomaly involved in the fact that in Canada, which supplies something like eighty-five per cent. of the world's production of asbestos, so little is done in the way of undertaking the manufacture of asbestos into finished articles. Why Canada, and, in particular the Province of Quebec—of the total value of the mineral production of which Province asbestos is accountable for half—should not derive some of the benefits that would naturally accrue from a proportion of the various forms of manufactures of asbestos being carried on in this country—and especially in Quebec in contiguity to the asbestos mines—has not seemed altogether clear to many of us. Hitherto the only manufacture of asbestos carried on in Canada—at any rate, in the Province of Quebec— has been that of asbestos boards which are manufactured at Lachine, near Montreal.

There is certainly a very general feeling in Canada that the fabrication of asbestos production in this country is eminently desirable. Last year, the exports of asbestos from this country were of the value of approximately $12,000,000. They probably represented, in manufactured form, something like seven times that amount in value. The action of the Canadian Johns-Manville Company, Ltd., in locating a plant in the Province of Quebec, for the manufacture of asbestos products will do much to right this state of things and to preserve for Canada and for Canadians something of the profit that accrues from the transformation of this valuable non-metallic mineral into the finished article.

Something About the Factory.

The factory in course of erection at Asbestos, Que., will thus be really a pioneer in the manufacture of asbestos products on any considerable scale in Canada. This week I had the advantage of a talk with Mr. W. M. Hiller, vice-president of the Canadian Johns-Manville Company, Ltd., and its general manager for Canada, with regard to the factory. It will be, as all the Company's factories are, standard to its purposes. It will be the last word in up-to-dateness alike of design and of construction; it will be a modern plant in every particular; and it will take advantage of all the latest scientific and other devices of use for the manufacture of asbestos products.

It need scarcely be said that for such products there will be awaiting them, at the outset, a large market in this country where previously we have been in the habit of using asbestos products of all classes imported from the United States. In addition, a demand from Australia and other parts of the British Empire for Canadian-made asbestos products can confidently be reckoned on. In fact, when conditions generally right themselves to a larger extent than at present, the opportunity for the profitable expansion and development of the manufacture of asbestos products in this country should be almost without limit. As regards the Canadian purchaser, it is obvious that, in lower freightage, in the absence of duties, and in the home manufacture of articles of every-day use, he will be getting advantages which must inevitably result in a substantial decrease in purchasing prices and in a consequent benefit to the Canadian public at large.

Company's Mines And Other Factories.

The machinery for the factory at Asbestos, Que., will come, much of it, from some of the Company's other factories. These other factories are seven in number, and are located at Manville, N.J., Milwaukee, Wisc., West Milwaukee, Wisc., Lockport, N. Y., New Rochelle, N. Y., Riverdale, Ill., and Nashua, N.H. Much of the machinery used in an asbestos factory is of a very expensive kind.

It should be added that, in addition to Toronto, the Company has offices in Montreal, Winnipeg and Vancouver, as well as in some fifty-six cities and towns in various parts of the United States. Mr. T. F. Manville is president of the Company; Messrs. J. R. Pearson (who is the Company's treasurer), C. H. Shoemaker and W. M. Hiller are vice-presidents; and Mr. H. E. Manville is secretary. The Company's products comprise over fifty lines, which include automotive equipment, building materials, insulating materials, power plant products, electrical products and specialties. There is a construction department for applying the Company's materials.

The Company's mines are situated at Asbestos, Que., about five miles from Danville, which itself is some eighty-four miles south of Quebec City on the Grand Trunk Railway. They represent an asbestos property as large as, if not larger than, any other in Canada which is another way of saying in the world. These mines give employment to between 700 and 1,200 persons, and are at present working to something like capacity. It is certainly a matter for congratulation that the first factory for the manufacture of asbestos products on any considerable scale to be erected in Canada will be owned and operated by a concern of such reputation and responsibility as the Canadian Johns-Manville Company, Ltd.

Geological Investigations in the Maritime Provinces

Part E of the Summary Report of the Canadian Geological Survey for 1920 consists of three reports on New Brunswick and Nova Scotia map areas, namely:

Coal Seams of Gloucester Co., New Brunswick.

G. A. Young reports on thin coal occurrences, of no economic importance, in the northeastern part of New Brunswick. The coal occurs in strata of an age not definitely determined, but which is thought to be of early Carboniferous date. The country is covered by drift, and rock exposures are few. No definite conclusion is possible as to the thickness of the sediments or the number of coal-bearing horizons, except as the result of systematic diamond-drilling, and without much further study and mapping, the expense of drilling is not warranted. The writer of the report enlarges on the accepted theory of coal deposition to combat a local belief that coal seams which are thin at their outcroppings are likely to gain in thickness under deeper cover. There has always been much dubiety about the age of the coal-bearing strata of New Brunswick, and in view of the general haziness of the stratigraphy and the little paleontological knowledge that has been gathered since Dawson's time, much more extended study leading to more exact understanding of the New Brunswick and Bay of Fundy strata generally, could be profitably arranged for, if the appropriations of the Survey could stand it.

Carboniferous of Sydney District, Cape Breton.

A similar impression of incomplete knowledge is conveyed by W. A. Bell's brief communication reporting progress in study of the paleontology of the Sydney District. Mr. Bell properly points out the looseness of the lithological terminology that has been used in describing the Coal Measures of Nova Scotia, originally based on the nomenclature used in Britain, and unfortunately implying correlation which is not determined to exist.

"For example", Mr. Bell states, "it has generally been tacitly assumed that the productive coals of the various coal district of Nova Scotia, that is, the Stellarton-Thorburn, the Springhill and the Sydney-Glace Bay, belong to the same epoch of sedimentation. On the contrary, the productive portions of these fields may represent several individual epochs."

As an actual matter of fact, there is so far nothing but intelligent assumption regarding the correlation of even the subordinate basins of the major synclinal structure of the Sydney coalfield, and the exact relationship of the seams on either side of Sydney Harbour, separated by only a mile of water, and with workings little over half a mile apart, is unknown. There has been no systematic paleontological work on the Nova Scotia coalfields since Dawson's time and, generally speaking, the coal geology of the Maritime Provinces is imperfectly understood and only partially mapped. The result of Mr. Bell's work will be looked forward to with long-deferred hope. Something of later date than the controversies of Prof. Lyman and Sir William Dawson, and the patient local investigations of Richard Brown would be very welcome.

Berwick and Lakeview Map Areas, Kings and Annapolis Counties, Nova Scotia.

E. B. Faribault communicates an eleven page report on the mapping of Kings and Annapolis counties in Nova Scotia, which was interrupted by the untimely death of Hugh Fletcher from pneumonia in the course of his field duties in 1909, and on which notaing has been done in the meantime with the exception of some work in the vicinity by A. O. Hayes in 1916.

The Paleozoic sediments in the areas examined are contorted and fossils are scarce and of obscure character, "referable to any age from Cambrian to Devonian". Mapping is therefore difficult and it was necessary, for example, to make a large scale map of certain well-defined quartzite bands in order to elucidate the structure.

The economic minerals of the district are given in detail. Metallic occurrences are numerous and varied, including gold, copper, manganese, and iron, but the quantities so far known are small and the deposits discontinuous. Of non-metallic minerals it is suggested that infusorial earth, white quartzite for silica, white and red clays and peat for leiter and fuel, should receive special attention in view of the well-settled character of the countryside and the nearness of railways to the deposits.

The structural geology of the vicinity of the iron-ore beds in the Torbrook-Nictaux district was examined, and the conclusion was come to that "the north and south beds of iron ore that outcrop about a mile apart and dip steeply towards one another are probably the same beds, repeated on the opposite limbs of a complex synclinal fold, composed of at least two minor synclines and one intervening anticline." It is regarded as possible that the iron ore beds of the Nictaux mines are brought up near the surface on this fold, and may be increased along the apex to form ore-shoots. In the Wheelock shaft, the shell-ore bed was found to increase in thickness from six to twelve feet on a fold, and a knowledge of the structure of the ore-beds may therefore be of great assistance in their development.

These ore deposits are not now being worked.

G. W. V. A. DRILLING COMPETITION AT COBALT.

The drilling competition at Cobalt on July 4th under the direction of the Great War Veterans' Association was a great success, and from all accounts would have been very fittingly accompanied by the C. I. M. & M. particularly its declamatory chorus.

Teams from the Kerr Lake mine took both first and second places. Contestants had to set up their tripods, which were laid out on the ground with all joints and extensions loose, and make all their own water and air connections. Fifteen minutes was given to set up and drill as much as possible.

Miller Bros. from Kerr Lake, took 1 min. 13 sec. to set up and connect, and drilled nine feet and five-eighths inches in 13 min. 47 sec. Williams and Horne, Kerr Lake, took 1 min. 8 sec. for the set-up and drilled 8 ft. 6¾ inches. Third place was taken by McGillivary and Brdyges, of Kirkland Lake Gold Mine (the only entry from points outside of Cobalt) who took 1 min. 49 sec. for set-up and drilled 7 ft. 7 3/8ths inches. Eleven teams in all drilled.

The competing drills included seven Cleo No. 88 "jackdrifters" made in Sherbrooke by the Canadian Ingersoll-Rand Co. and six other drills of United States manufacture. The Sherbrooke drill took all the prizes, getting the first six places and ninth place.

Why a Tariff on Asbestos?

An Authoritative U.S. Opinion.

Last month we referred briefly to an article appearing in the India Rubber Journal of May 21st, in which, under the head "Export or Branch Factories," Mr. J. Alfred Fisher, Chairman of the Board of Bell's United Asbestos Company, Limited, London, England, severely criticised the suggested tariff schedule on Asbestos goods now under consideration by the United States Congress.

Mr. Fisher intimated that the imposition of high import duties by the United States would probably result in English manufacturers establishing plants in the United States.

Since the India Rubber Journal is printed in England, we were not particularly surprised at its point of view. When, however, the Canadian Mining Journal, of issue May 27th, reprints the India Rubber Journal article, and then goes further to say editorially that Canada would welcome the establishment of English-owned plants in Canada, and that Canada should oppose the establishment of English owned plants in the United States, then we are not only surprised, but utterly confounded.

The Canadian Mining Journal is looked upon as a dependable authority concerning Canadian Mining matters, hence it is the more difficult to understand how its editors could have overlooked the real point in this whole situation.

The principal producing Asbestos area in the world is in the Province of Quebec; the major part of the Asbestos producing properties is owned by Canadians. Eighty-five to ninety per cent. of Canada's production is shiped to United States manufacturers. Does the Canadian Mining Journal realize that English manufacturers, even in pre war times, took a relatively small percentage of the Canadian output and that, during and since the war, that percentage has been steadily decreasing, owing to the fact that several of the leading English manufacturers have purchased and are operating large Asbestos producing properties in Rhodesia and South Africa?

We can think of nothing more inimical to the interests of Canadian producers of raw Asbestos than the encouragement of low tariffs on imports of Asbestos manufactures into the United States, because it is a well known and readily understood fact that most of the merchandise which would be offered by European manufacturers would be made from raw Asbestos obtained from sources other than Canada.

To be sure the rates which have been asked of Congress will discourage the imports of manufactured goods; but from the point of view of the American manufacturer, the American financier, or the Canadian producer, all the evidence at hand indicates a necessity for adequate tariff protection.

Under the title "Wages in the United States for Foreign Countries," a 103 page book has been issued by the U.S. Government Printing Office, and prepared for the use of the Committee on Ways and Means of the House of Representatives. In this most carefully prepared survey of the subject appear some very interesting comparisons of wage rates paid in different countries to different classes of workers. For instance, weavers in the United States receive $39.00 per week, in Germany, $4.35, Japan $6.00, England $17.70, Belgium $9.63. The same ratio maintains throughout other classes of labor. Just how the American Manufacturer is to remain in business and meet in competition merchandise manufactured by labor securing anywhere from fifty down to about 10 per cent as much as is paid in the United States is rather hard to understand.

Added to this great labor advantage, the European Manufacturer has obtained control of the second largest raw Asbestos deposits, (in Rhodesia and South Africa) and since the raw Asbestos in these fields is produced by kaffir labor, working at an average wage of 25c a day, just how the Canadian producer of raw Asbestos, paying an average daily wage of $4.00 is to meet this competition is not quite clear.

It is obvious that English manufacturers would utilize in American or Canadian plants controlled by them, Asbestos from their own mines. Their own mines are not in Canada, hence the establishment of English operated plants in either United States or Canada clearly means that these plants would consume as little Canadian raw Asbestos as would be absolutely necessary.

We would be interested to know whether the Canadian Mining Journal in writing its editorial, discussed with any Canadian producer of Asbestos the question at issue, and particularly the probable effect upon the Canadian Asbestos business in case finished Asbestos merchandise from European plants is admitted to the United States on the present ruling scale of duty.

Then, too, in considering this question of tariff it is most interesting to study the attitude of our international competitors toward it.

Canada has a protective tariff much higher than ours, and it can, under the law, be increased at will by a so-called Order of Council.

England has a tariff which runs as high as 66 per cent.

Austria maintains a wall of protection eighty times higher than her pre-war schedule.

Chile has put up heavy barriers to protect her agricultural interests.

The nations of the world are not operating on an altruistic basis and it cannot logically be expected that they will so operate.

Just why America is supposed to play a lone hand in this game of blind man's buff is not clear.

ASBESTOS FIBRE USED IN PAVING.

"Canadian Engineer" contains a note by H. Caldwell, Warren Bituminous Paving Company, regarding laying down on Woodbine Ave., Toronto of 600 sq. yds. of a bitulithic pavement containing finely divided asbestos fibre as part of the aggregate. A test area of pavement of similar composition was laid down in New Bedford, Mass., on a heavy traffic street, and as a last resort in the search for a pavement material that would stand up against the heavy loads from the cotton mills. It is said to have given desired results. The asbestos fibre is said to add qualities of toughness and indestructibility by wear that more than compensate for the additional cost of the asbestos fibre. As presumably the qualities of flexibility and suitability for spinning and textile uses would not be so important in pavement uses, there would seem to be an opening in this novel departure for use of asbestos that are not now highly regarded for textile purposes.

NEWS FROM THE QUEBEC ASBESTOS DISTRICT.

From the July Bulletin of the C. I. M. & M.

THE asbestos industry is passing through a period of quietness. The majority of the mines are working one shift only, five days a week, and with reduced forces at that. The present condition at the mines is attributed to the state of the asbestos market, which is said to be absolutely inactive. Reasons for this are the inability of British manufacturers to resume operations on account of the coal strike, and the difficulties experienced by American manufacturers in disposing of their output—due no doubt to some extent to the rates of exchange between European countries and the United States, and partly also to the sluggish revival of the building trade, notwithstanding the dearth of dwellings in populated centres.

Shipments are at a very low ebb compared with those for the first three months of the year, which are always small months for production. According to the monthly report of the Department of Trade and Commerce, shipments last March exceeded (in tonnage) those for the corresponding month in 1920 by 33 per cent. This no doubt represents the balance of contracts signed during 1920.

During May, wages were reduced, and common labour is paid now at the rate of 32½ cents an hour; a reduction of ten cents on last year's wages.

Until this year, there was only one firm in the Province of Quebec manufacturing asbestos goods—the Asbestos Manufacture Company, Ltd., who supply the building trade with well known grades of asbestos paper, shingles, pipe covering, etc. Since April a second factory has opened in the province at East Broughton. Here Mr. Jos. Poulin has a well equipped plant to thread, spool, and weave, asbestos fibre, and he is making brake linings. The goods are sold under the trade name of *Asbestonos,* and the first shipments have been to automobile supply dealers. It is also reported that the Canadian John's-Manville Company, Ltd., which operates a mine at Asbestos, near Danville, has let out contracts for the construction of a large plant for the manufacture of all classes of asbestos products formerly imported from the United States. These products include asbestos paper, roofings, shingles, packings, pipe coverings, textiles, brake linings, etc.

At East Broughton the only actual producer is the Quebec Asbestos Corporation. This company has been seriously inconvenienced since the compressor plant on the mine was burned down on the 25th of May. The company is now getting air from the compressor plant of the Asbestos Fibre Mining Company, located on the adjoining lot, which property is now owned by the Quebec Asbestos Corporation.

The Asbestos Mines, Limited, previously known as the Boston mine, and which was purchased last year by Mr. J. A. Jacobs of Montreal, has remodelled the mill near the main line of the Quebec Central Railway. As the mine is on lot 13 of range IV, a distance of a little over a mile by team road from the mill, a cheaper method of transportation had to be resorted to. An aerial cableway was constructed, and completed on the 1st of June of this year. The installation consists of two ore-bins, one at each end of the line. The one at the pit end has a capacity of 500 tons, the other at the mill end can hold twice that amount. The distance between the bins, from centre to centre, is 4,250 feet. The difference in elevation between the charging floor at the pit and the receiving floor at the mill-head is such as to permit the aerial line to be run practically by gravity.

At the end of 1920 the property of the Asbestos Fibre Mining Company was purchased by the Quebec Asbestos Corporation. The mine of the first named company is shut down.

All work has been stopped at the Fraser mine; and only a few men are to be seen around the plant of the General Asbestos Company.

At Robertson, the Federal Asbestos Company is working one shift five days a week. The old inclined tunnel and the crushing plant at the bottom of the open-cast pit have been abandoned. The rock is now hoisted by a new incline following the edge of the pit.

The mine of the Pennington Asbestos Company is one of the few working day and night. They have been steady shippers during all this spring.

Mr. Donat Guilmette has re-opened an old prospect on lot 13 of range IV of Thetford township. He has just completed a mill of very small capacity to test the rock on this property.

At Thetford, there is little activity. On June 1st only one mine, the Bell, had men working at night. The Johnson's mine is completely shut down, and the Bennett-Martin has only a few pickers of crude at work. The other mines are working on day shift only.

The Consolidated Asbestos, Limited, apart from carrying on operations on a reduced scale at their Thetford mine, are remodelling the mill of the Berlin mine on lot 2, range V of Thetford township. The property had previously been worked during the years 1910 to 1912 by the Berlin Asbestos Company, Limited. The Consolidated Asbestos, Limited, also acquired mining rights last fall on lots 23 and 24 of range II of Wolfestown township. During the winter the mill on one of their other properties was taken down and rebuilt on these lots, near the old Smith mine. A number of other houses have been put up which are to be used in connection with the mining operations here.

The Maple Leaf Asbestos Corporation, which has a long term lease on the Reed lot, range A of Coleraine township, has had a well equipped mill built near the open east pit worked previously by Messrs. Blais & Fillion. The mill has now been in operation for a few weeks.

At Black Lake, the conditions at the British Canadian mine are similar to those of the Thetford mines. At the property of the Black Lake Asbestos and Chrome Company, Limited, improvements are under construction in the track lay-out around the mine and the mill. This will permit easier train manoeuvres.

Back of the Black Lake hill, on lot 23, range B (known as the Ward-Ross lot), the Asbestos Crude and Fibre Mining Corporation, Ltd., has a mill in course of erection. This lot was prospected last summer by Mr. W. Jacobsen.

Near Coleraine, the Vimy Ridge mine has resumed operations under the management of Mr. C. H. MacNutt. Alterations have been made to the flow-sheet of the mill during the winter season. The Canada Asbestos and Chrome Company, Ltd., has started to operate its mill, recently built on Block B of Coleraine township, one and a half miles north of Coleraine station.

The Windsor Asbestos Company, Ltd., is also operating.

The Weedon mine was the last of the cupriferous pyrites mines to close. The state of the sulphur market and the low price of copper have to share the responsibility for the shut-down of the Eustis and the Weedon mines.

Only one chrome mine is now operating: that of the J. V. Belanger Mining Company. Some twenty tons of chrome concentrates are produced daily. The Mutual Chemical Company of Canada disbanded its staff last January, and the mine is now flooded. The headframe over the mine shaft of the Caribou mine of the Black Lake Asbestos & Chrome Company, Ltd., has been dismantled.—D.

SUDBURY NOTES.

By D. E. CUSHING.

Another cycle of mining prosperity seems due in Northern Ontario, especially in gold camps, and strong efforts are being put forth to develop production somewhere in this area that years ago boasted of many mines.

Today there are four distinct operations, or group of operations in this vicinity, attempting to turn out a producing mine.

The most unusual enterprise is that nearest to Sudbury. With a desire to place Sudbury area on the map as a gold as well as nickel-copper producer, 100 of Sudbury's leading merchants and business men have put up $100 each and incorporated the Mines Service Corporation. It is a movement to find out whether or not there is gold in the Sudbury District. They placed an experienced prospector in the field, and already he has located a promising prospect. It is located east of here near Whanipatae Lake. A vein about fifteen feet wide has been traced for a half mile. It is on a contact of quartzite and conglomerate and is intersected by quartz stringers. Free gold has been generously found in the outcrop. It is the intention to do some trenching and stripping and sink a few test pits to find out the values.

The next camp of importance is the Howery Creek, where three companies are operating. The trio believe that they have what will prove to be good mines and their assay sheets so far lend every encouragement. The Howery Creek Co. plans to treat the ore for arsenic as well as gold and platinum. All three properties are now engaged in shaft sinking.

Farther on to the west comes the Goudreau as the scene of renewed activity. Some rich samples, studded with free gold, have been brought out of that camp, and just lately the Porter interests of Toronto have taken an option on the newly discovered Murphy Claims. J. G. Daimpre, former manager of the Associated Gold Fields of Larder Lake, has taken charge of the development. The Goudreau camp cannot be said to be anything but a prospect as yet, but a certain amount of sinking has been done and as far as the work has progressed, it has shown results warranting most of the enthusiasm displayed over the camp.

Half a mile east of Schrieber is the Jackson and other mines and here is the prospect of another good camp. This is far from a new camp. The Jackson mine, owned by W. S. Jackson, Fort William had a certain amount of work done on it 40 years ago, but it was never patented and reverted to the Crown. Jackson staked it and has been working on it for the past six years.

Eleven veins on surface have been traced over the property, running over a large hill, 500-ft. high at its loftiest point. The veins are parallel, and test-pits sunk indicate that they run true to their position on surface, this making it possible to cut all by means of a tunnel from the hill side. It is understood that a ton of ore taken from these veins and shipped to Kingston produced gold to the value of $118.21. Other assays show even higher values, but all are practically surface. Work on cutting a tunnel in 100 feet which will cut 265 feet below the top of the hill is now being started. A small mill to handle some 15 tons daily is to be installed.

Another interesting fact about this property, is that tests of sands in the valley of this large hill, pan gold in sufficient quantities to make placer mining a paying proposition. There are 6 to 8 inches of this sand, while beneath it and in the centre of the basin a vein was found and one shot showed that it had a width of ten feet. It appeared to be equal in richness to the other veins, but as these two discoveries are but recent ones, the assay reports have not been received as yet.

It is understood that John Caldwell, Winnipeg, owner of the old Sultana Mine, is negotiating for the purchase of some of the Jackson claims, and if a deal is made will move the machinery of the latter mine to the new property.

The Missabe Iron Mining Company is interested in this area also, through one of its officials, John Lee who has staked claims to the east of the Jackson holdings. Samples from these claims show 46.74 magnetic iron. Two miles to the west, Lee also made what is believed to be an important discovery. Not much work has been done but assays from samples picked near the surface give $18 in gold. Not far from this latest discovery are two claims reported to contain nickel ore of Sudbury type.

It would be most interesting to see this old abandoned area come through with a big producing gold-mine. There are today many abandoned mines along the North Shore of Lake Superior, which for the most part were operated from about 1853 to 1886, but abandoned usually because lack of transportation facilities, made mining too difficult.

PERSONAL—MR. J. F. K. BROWN.

Mr. J. F. Kelloch Brown has been appointed Assistant General Manager of the Hudson Coal Company, Scranton, in charge of all engineering. The Hudson Coal Company is a progressive anthracite mining concern. It had a record month's output in June of 840,000 tons, and a production of 9,000,000 tons is probable in 1921. Mr. Brown was with the Dominion Coal Company about 1912, and was afterwards for a short time with the A. D. Little Company and the Honorary Advisory Council for Industrial & Scientific Research. He has made a special study of the mining of thin coalseams, and prepared a bulletin on this subject which was published by the Mines Branch at Ottawa a few years ago. The Hudson Coal Company is mining anthracite under unique conditions. Seams under two feet in thickness are being extracted from beneath the broken waste and pillars of previous workings. In several instances, surface streams have been diverted or flumed to permit the working of anthracite seams lying below at short distances. Very large expenditures have been made by the Hudson Company on new wet-breakers and on a comprehensive scheme of electrification of all operations. Mr. Brown's friends will be glad to hear of his promotion, and to hear of the successful application of ideas that must soon find much more general application than they have yet attained. The principle of working superimposed coalseams with a view to the most economical admixture of the costs of thin and thick coalseams, and with definite planning and forethought as to the effect of workings in a lower seam upon a higher seam in the series, or vice-versa, is one that the Hudson Coal Company has comprehensively adopted.

BRITISH WHITE PAPER ON THE EXPLOSIVES COMBINE RECOMMEND CONTINUOUS STATE SURVEILLANCE.

A White Paper (Cmd. 1,347) was issued last week containing a report on the explosives industry, prepared by a sub-committee appointed by the Standing Committee on Trusts. The terms of reference were: "To inquire into the existence of any trade combinations of makers of explosives and ammunition, and the effect of any such combination or combinations, if found, upon supplies and prices."

The Committee's conclusions may be summarised as follows:—

(1) There are in the explosives industry four combinations, viz.:—(i.) The High Explosives Trade Association, (ii) the Safety Explosives Trade Association, (iii.) the Electric Detonator Fuse Trade Association, (iv) the Fig. Signal Association.

(2) These Associations fix the manufacturers' and retail minimum prices of practically all the explosives, detonators, and fog signals manufactured and sold in this country. Moreover, by reason of supplementary agreements with foreign manufacturers, these prices become the standard prices of practically all imported explosives; there is virtually no price competition.

(3) Foreign competition may be said to be negligible except in the case of sporting and rifle ammunition, and there seems to be little prospect of it becoming severe in the near future, in view of the agreements held by the Nobel Combine and the principal Associations with foreign manufacturers, which have for their purpose, amongst other things, the standardisation of prices and territorial restrictions of markets.

(4) All the explosives companies in this country, with the exception of three relatively small concerns, constitute one group—the Nobel Combine—under the control of Nobel Industries, Limited.

(5) This Combine at the present time practically controls the policy of the various trade Associations, and is thus able to determine substantially the prices at which explosives and detonators are sold in this country. The power of the Combine is not affected by the competition of the independent manufacturers, and there is nothing to prevent the Nobel Combine from maintaining prices at a higher level that they would have been had their constituent occupation remained unassociated.

(6) For reasons stated in the Report, the agreement of the Board of Trade and the Treasury with the Nobel Combine does not appear to afford a workable scheme of control or supervision, and the Committee recommend, therefore, that the powers of the Board of Trade should be supplemented by statutory authority to require from the Combine any information which may be necessary to enable review to be made of its operations and prices, and to enable the Board to make recommendations for the adequate protection of the consumer.

(7) The formation of the Combine opens up the possibility of economies in management costs and overhead charges, and of increased efficiency in production, and points to the probability of general advantages resulting from centralised research and from the institution of central buying and selling organisations. The effect of it should be to reduce the prices charged to the consumer, but there is no guarantee that this will be the result other than the powers given by the agreement to the Board of Trade, the inadequacy of which is pointed out in the Report.

The Committee regret that it has been found impossible, owing to the early expiration of their powers, to conclude an investigation into the costs of production and profits, or to make a complete survey and review of the financial operations and results of the Combine, with which some 78 companies are associated more or less closely.

The question of the effect of combinations on prices is touched on only briefly in the Report, but a statement is given of the prices of the principal explosives during the years 1913 to 1921. They represent the highest prices reached during these years. The following are some of the figures extracted from the table:—

	Gelignite per ton.			Blasting gelatine per ton.			Electric detonators No. 3, per 1,000		
	£	s.	d.	£	s.	d.	£	s.	d.
1913	85	0	0	115	0	0	4	12	0
1916	115	0	0	145	0	0	7	1	0
1918	160	0	0	190	0	0	8	11	0
1920	170	0	0	215	0	0	8	11	0
1921	170	0	0	215	9	0	8	11	0

The Committee have been furnished with a statement of the cost of raw materials, ingredients, and labour during the years in question, and these undoubtedly show a considerable increase. Without a costings investigation or an exhaustive study of these figures, however, they are unable to express an opinion as to whether the increases in the selling prices as given in the above table have been reasonable or otherwise.

In view of the monopolistic control exercised by the Nobel Combine over the explosives industry, the Committee strongly urge that its operations should be brought under the continuous and effective surveillance of the Board of Trade or some other Department of State, on the lines of the recommendations contained in the Report dated April 24, 1919, of the Committee on Trusts. The present authorised capital of Nobel Industries, Limited, is £21,000,000, and they now hold practically all the share capital of the 33 firms embraced in the merger. Of these 28 manufacture explosives, ammunitions, or accessories, but 6 are either liquidated or in course of liquidation. Of the 14 firms in which a controlling share interest is held, 7 produce explosives; of the 24 businesses where the holding is between 33 1/3 and 75 per cent., only 8 produce explosives, and of these 5 are in other countries; all the companies in which relatively minor interests are held manufacture explosives, but with one exception they are situated abroad.—"Colliery Guardian."

DEVELOPING ASBESTOS PROPERTY, MATACHEWAN AREA.

Development work is being carried on at the Sinclair asbestos property in Bannockburn township, Matachewan district. Samples of first class asbestos have been brought out from the property and arrangements have been made to bring out a sample carload of 'crude'. Mr. Wm. Judge is in charge of operations. Owing to transportation difficulties only the better grade of fibre is being considered at present. As No. 1 crude brings over $1,500 per ton, transportation on this class of material is not prohibitive. The lower grade product will however be of no value until better facilities are available. The proposed new light railway would help the development of the asbestos area.

ACCIDENT PREVENTION IN CAPE BRETON.

M. L. Fraser, Field Officer of Nova Scotia Accident Prevention Association.

Two hundred and seventeen employees of the Dominion Coal Company have successfully passed examinations on "First Aid to the Injured" and in the course of a few days will receive diplomas from the St. John Ambulance Association. During the past winter this company organized and carried on among its employees sixteen classes in "First Aid." The total enrollment in these classes would be approximately 450, but on account of the unstability of circumstances only the 217 referred to were able to attend all the lectures and therefore qualify for the examinations. The net result of the Company's initial effort is 450 men instructed in first aid measures, 217 of this number fully qualified certificate holders. This is a most commendable performance worthy of being emulated by the other large industrial concerns of the Province. The value of trained first-aid men in any community is most obvious and particularly is this so in regard to mining and industrial communities.

First-aid equipment has been going into Glace Bay in practically carload lots. This is actually so in one instance, as recently the Company received a carload of the latest type of stretchers. These stretchers are kept in convenient places on the surface and underground, and are so situated that no matter where a man is injured there is always one near at hand on which to take him to the "First Aid Station." Those underground are protected from dampness and dirt by galvanized containers. At every bankhead there is a "First Aid Station" which is in charge of one of the recent first aid graduates. These stations are splendidly equipped with approved appliances, comfortable beds, necessary medicines, etc. are always warm, and absolutely clean and tidy. In those stations which are not in close proximity to a regular hospital there are also standard hospital operating tables.

Accident prevention measures, as well as first-aid instruction and equipment, are receiving the serious attention of the Coal Company's management and officials. The "Safety First" campaign began with a general clean up of scrap material and rubbish around the various collieries. In this general clean-up something like eighty-seven carloads of material were gathered up and properly disposed of. As a consequence the different bankheads, yards, machine shops, etc. now present a tidy and well kept appearance, and the accident hazard in them is correspondingly lessened. In conjunction with the cleaning-up process, attractive signboards have been freely displayed calling attention to places where danger exists and soliciting the co-operation of everyone in the campaign of "Safety First."

The safety organization of this Company functions similarly to that of the United States Steel Corporation and other large American industrial concerns which have had remarkable success in this work. There are in all twelve Safety Committees, eight are mining bodies from the different districts, two are from the two shipping-piers, one represents the Mechanical, Electrical and Railway Departments, while the twelfth is the General Executive Committee.

All Committees meet regularly once in every two weeks. The duties of the eleven district and department committees are as follows:

(1) To make a general inspection of the whole plant at least twice a month, and make a written report of the safety and sanitary conditions in and about the plant on forms furnished for that purpose.

(2) To make a record of all safety problems that come up in their respective departments from day to day, and to submit these reports to the committee at the regular meetings for discussion.

(3) To investigate all accidents and consider in each case methods of preventing a repetition. The result of this investigation to be made in writing to the Safety Department.

(4) To caution and warn fellow-workmen against unsafe practices, and to report to the foreman any cases where a fellow-workman does not heed the warning given.

(5) To help enforce all Safety rules and regulations.

They finally dispose of all minor matters brought up, while matters of major consequence and involving the expenditure of more than a stated amount of money are referred by them, with recommendations, to the General Executive Committee. This Committee is made up of twenty-one of the Company's officials, the Assistant General Manager being Chairman and the Superintendent of Industrial Relations, Secretary. At its fortnightly meeting all recommendations from other committees are discussed and acted on, as well as all other matters pertaining to safety and first-aid. Acting in conjunction wth these committees there is a capable and experienced Safety Engineer and an equally capable Safety Inspector.

The Company is a member of the National Safety Council of Chicago, and from it receives sixty Safety Bulletins a week. These are displayed on attractive-looking bulletin boards situated in most suitable places all over the Company's properties. In addition to these purchased bulletins, some home-made ones are displayed having a local application, as well as circulars covering various phases of the safety work, such as one calling attention to the necessity of having small cuts and scratches properly cared for in order to avoid blood-poisoning.

Although the safety organizations has only been functioning for a few months, yet considerable good has been done. In four months $26,000 has been expended in the purchase of safety and first-aid equipment. Guards have been placed on dangerous machinery parts, safety railings and fencing built where necessary, safety electric switches installed on high-voltage currents, dangerous practices on the Company's railroad stopped, and in many other ways the activity of the organization is displayed.

THE EDMONTON MEETING OF THE C. I. M. & M.

The Annual Western Meeting of the Canadian Institute of Mining & Metallurgy will be held in Edmonton on the 14th, 15th and 16th of September. Mr. T. B. Williams is the Secretary in charge of arrangements, and will be glad to make hotel reservations for visitors. The provisional programme includes an address by the Albertan minister in charge of mines, an address by the President, Mr. C. V. Corless, luncheons and the annual dinner, visit and entertainment at the University of Alberta and a special train in connection with a visit to the Oliphant-Munson and Cadomin and other representative collieries.

Mineral Production of British Columbia in 1921

(From Our Victoria Correspondent.)

The official report of the value of the mineral production of the Province of British Columbia for the year 1920 places it at $35,543,084 in comparison with $33,296,313 for 1919 and $41,782,474 for 1918. The estimated output value for 1920 was $35,580,625, the difference being so inconsiderable as to warrant special comment and a word of congratulation to those officials of the Department of Mines responsible. The mineral production of the province from 1852 to the present now is placed at $706,192,978. This figure, however, must not be accepted as incontestably correct as the statistics for ten or fifteen years following 1852 are open to some question, there being no doubt that much of the gold production of the Cariboos, for instance, was taken out of the country without official record.

It now is possible to make the definite statement that the gold production of the province in 1920 dropped $734,153 in value. This is a considerable decline, perhaps not altogether accounted for by the stock explanation of increases costs of labor and supplies. However, it is likely to climb soon, if not this year the next should show an improvement. There is a marked increase in interest in placers by the individual miner, the hydraulic operator, and the dredge operator. The changes in the Placer Act also is having its effect. Large sections of river beds that are promising but have been held by lease holders in arrears in respect of their rentals are being thrown open and as quickly taken up by individuals and companies meaning business. Of the $221,600 taken from the placers of British Columbia last year the greater part came from the Cassiar and the Cariboo Districts. Not only is there much room for greater production in those sections but there are other parts that should figure prominently in the reports of the future. There was a decline of 21 per cent in the lode-gold production, $2,481,392 for 1920 and $3,150,645 in 1919, the Granby Company having closed its mine and smelter in the Boundary District, the Nickel Plate Mine having been closed down in the month of September, and the Rossland Mines having failed to contribute their usual quota.

Of silver there was a production of 25,270 oz. less than in 1919, the decline amounting to 10 per cent. Decline in the market accounts in a substantial degree for this unsatisfactory showing. Copper output increased in volume, being 44,887,676 lb., or 2,428,337 lb. greater than in 1919, but in value there was a decrease, again owing to market conditions. Lead statistics tell a different story—an increase in quantity of 9,855,250 lb. and in value of $1,289,260 or about 84 per cent. The smelter of the Canadian Consolidated Mining and Smelting Co., Trail, must be given credit for the greater part of this and the fact that lead was the only metal to increase in value over 1919 accounts for the gratifying comparison with the previous year's results. Zinc fell in output from 56,737,651 lb. in 1919 to 47,208,268 lb. in 1920, the production being valued at $3,077,979, a decrease of $462, 450 or about 17 per cent.

Under the heading "Other Minerals" some interesting information is given. Comments made in this connection follow:

Iron.

So far there has been no metallic iron produced in British Columbia, but it has been strongly advocated in many quarters that the conditions are favourable for the establishment of an iron-smelting plant somewhere on the British Columbia coast. So far nothing definite has materialized, although there is apparently a prospect of such a plant being established. As is well known, there is on the Coast, in the aggregate, an adequate supply of magnetite-iron ore, quite sufficiently free from impurities as to be within the "Bessemer limit" to supply ore for such a plant.

Further investigation of the Taseko limonite-deposits was made during 1920 by a party sent out by the Department of Mines. The deposits were also examined in detail by Dr. J. D. MacKenzie, of the Geological Survey of Canada.

The only shipment of iron ore made this past year was for 220 tons from the Iron King at Alta Lake to Vancouver.

Platinum.

The well-known fact of the wide occurrence of platinum throughout the Province in connection with our placer-gold deposits gives reasonable hope that such may be found in payable quantities and justifies further investigations. As far as reports received indicate, the only output this year is about $400 worth from the Similkameen District.

Molybdenite.

Since the Armistice the market is dormant, like other metal prices, but nominal quotations vary from 75 cents to $1 a pound. No advice has been received of any shipment this year.

In 1918 about 800 tons of chromite ore, carrying from 30 to 45 per cent chromic oxide, was shipped from the Mastodon claim, Grand Forks Division; and a deposit on Scottie Creek, near Clinton, but no shipments were made. With the end of the war the market for chromite temporarily collapsed ,as large stocks were available, with no purchasers in sight. It is believed that no ore was shipped in 1919 or 1920.

Manganese.

Nearly 600 tons of manganese ore, running over 50 per cent manganese and less than 20 per cent silica, was shipped from the Hill 60 property on Cowichan lake before the roads became impassible through winter rains. The company has installed an aerial tramway, which should prevent, in the future, interruption to sustained shipments. During the latter part of the year shipments ceased and development work only was carried on.

Non-metallic Minerals.

About 7,500 tons of fluorspar concentrates was shipped from the Rock Candy group, in the Grand Forks Division. This property is owned by the Consolidated Mining and Smelting Company and is equipped to make steady shipments in the future. The growth of this property has been very interesting during the last two or three years. The property is now equipped with an efficient concentrating mill, in which about 20,000 tons of ore was traced, producing nearly 7,500 tons of concentrates, carrying about 87 per cent calcium fluoride and 6 per cent silica, and having a total value of about $175,000. The mineral is shipped to the Trail smelter and is used for making hydrofluoric acid, which is used in the lead-refinery, and to other points in Canada and to the United States.

Shipments of magnesium sulphate (Epsom salt) were made from Spotted lake, Osoyoos Division, but figures

have not been obtained. About 1,100 tons of magnesium sulphate was said to have been shipped from deposits of this material near Clinton.

Deposits of hydromagnesite in the Clinton Division, which are reported to be large and of great purity, have attracted considerable attention during the past year. No shipments have been recorded.

A production of arsenic valued at $22,000 was made by the Nickel Plate mine in 1920.

Talc.—Some 100 tons of talc was mined and ground in the Victoria Mining Division, for which product there appears to be a large demand.

Some 100 tons of talc was mined and ground in the Victoria Mining Division, for which product there appears to be a large demand.

Iron Pyrites.—At the Sullivan mine in East Kootenay some 4,300 tons of iron pyrites was mined and shipped to Trail.

The Coal Mines.

Coal figures show an increase over 1919 of 287,826 tons gross and of 327,584 tons net. The 1920 gross production of coal was 2,696,774 long tons of which 101,649 tons was made into coke leaving the net production of 2,595,125 tons. The quantity of coke made was 67,792 tons, which is a decrease of 23,346 tons as compared with 1919. The greater part of the gross Provincial coal coal production still is being mined by three companies—the Crow's Nest Pass Coal Company of East Kootenay, the Canadian Collieries (D) Ltd., and the Canadian Western Fuel Company of Vancouver Island, which mined, collectively, 77 per cent of the output. There are no new developments of special note in the Vancouver Island, the Nicola-Princeton and the Eastern British Columbia coal fields but reference is made to "a new coalfields opened up in the Omineca (northern B.C.) where a small colliery is being developed on the Telkwa river that last year shipped 1,400 tons of coal." Of the gross production for 1920 there was sold for consumption in Canada 1,384,005 tons; in the United States, 792,293 tons; and in other countries, 7,647 tons. All the coke produced came from the Crow's Nest Pass Coal Co's. ovens; those of Cumberland, V.I., were not operated, and the by-product ovens of the Granby produced for the use of the Anyox Smelter only.

ANGLO-PERSIAN COMPANY TO PROSPECT NEWFOUNDLAND FOR OIL.

It is announced that the Newfoundland Government and the Anglo-Persian Oil Company, through its subsidiary, the D'Arcy Exploration Company, have concluded an agreement which gives the oil company exclusive rights during a period of two years to prospect all unoccupied Crown lands in Newfoundland for oil, bitumen, natural gas, and clays or shales capable of yielding oil. The "Financier" of London states that the oil company has despatched three staff geologists to commence the survey, and gives detailed particulars of the agreement entered into, as follows:

"The company is entitled during the prospecting period to enter upon every part of the unoccupied Crown lands, and make geological and topographical surveys thereof. The surface of the land may be turned up to depth not exceeding 20 feet and the company shall from time to time furnish to the Government full reports of all surveys, together with all necessary copies of maps and plans relating thereto.

"There may be removed samples in reasonable quantities. Payment must be made by the company to any third party in reasonable compensation for injury or damage, and at all times the Government must be kept indemnified against all liability.

"If the company shall at any time during the prospecting period give notice to the Government that it desires to test any part of the unoccupied Crown Lands, not exceeding a total area of 3,600 square miles, it shall be entitled during the remainder of the prospecting period and for a further period of three years after the first two years to test the lands comprised by sinking therein such test wells as it thinks fit without payment. The company may retain or dispose for its own account and benefit any substances of the natures that have already been enumerated which it may discover or obtain during the period. This is providing, however, that the company shall, within six months after the expiration of the prospecting period — two years — have commenced to sink at least one test well in respect of each area, and thereafter vigorously prosecute the sinking. Unless this is done it shall forfeit all further rights to test an area.

"Any lease that the Government shall grant to the D'Arcy Exploration Company prior to the expiration of the latter three years shall be for a term of ninety-nine years from the date of determining an area to which a lease relates, but power is given to the Government to determine the lease in the event of failure continuously to work and develop the property.

"It is provided that the consideration by the company shall be the payment in cash to the Government of one-eighth — 12½ per cent — of the value at the easing head of all oil won during the term of a lease.

"Whenever the company shall be desirous of acquiring a right of way for tramroads, or roads or sites for wharves and piers, or an increased quantity of surface land for purposes connected with the working of petroleum oil or other substances already named, it shall be entitled to a grant of unoccupied Crown lands at the price of 30 cents an acre.

"The company may then construct, maintain and operate suitable pipelines, telegraph and telephone lines, railways, tramways, aerial ropeways, roads and bridges from any parts of the lands comprised in leases, to any points on the seaboard which it may select. Workmen's houses and business offices and refineries may be erected.

"The company shall not be required at any time during the currency of a lease directly or indirectly to pay to the Government any tax, assessment, levy or other payment in excess of the rate paid by any other person, firm or corporation in the Colony.

"There may be imported all material and plant required for the purposes of the agreement with the Government free of import duty for a period of twenty years from the date of the agreement. This applies to both original installation and any further extension, but does not include the substitution of old material and plant.

"Within one month from the expiration of each year for the term of every lease returns must be made to the Government, verified on oath by the lessee, of the total quantity of oil won by the company during each year and the value of such oil at the easing head."

NOVA SCOTIA COLLIERY NOTES.

Production from the Glace Bay collieries of the Dominion Coal Company in June was 295,097 tons, comparing with 282,520 in June 1920. Work at the mines was not continuous throughout June, but the output is the largest since last November. For the half year, the Glace Bay mines produced 1,422,796 tons, which is 192,477 tons below the production of the first half of 1920. Having regard to the capacity of the mines and the trade outlook it is not to be expected that production for the remaining six months of the year will increase, and indications are that 1921 output will reach about 3,100,000 tons, comparing with 3,260,000 tons for the year 1920.

Outputs from the Springhill Mines continue practically unchanged around 30,000 tons monthly. For the six months of 1920, outputs total 210,000 tons, approximately equal to those of the first half of 1920.

The output from the collieries of the Nova Scotia Steel and Coal Company for June was unusually large, amounting to 61,300 tons, comparing with 43,182 tons in May. For the first half of the year, outputs total 283,825 tons, comparing with 315,329 tons in the corresponding period of 1920. Scotia's coal production in 1920 totalled 633,845 tons, but the outputs for 1921, under probable trade conditions, will scarcely exceed 575,000 tons.

The production of coal in the province has distinctly slowed up in recent weeks. The extra demand arising from the British coal strike helped the Nova Scotia collieries and avoided idle time during the early Summer, because the St. Lawrence has not, and does not promise to take all the coal that the collieries can provide. Large purchasers of coal, from lack of cash and reduced scale of coal consumption, are holding back from commitments, and it appears likely that broken time will be the rule at the collieries during the remainder of the year. The mainland collieries will experience a little better demand as Winter approaches, but no immediate thorough recovery of buying ability is looked for.

The Dominion Coal Company has closed down its No. 17 Colliery, a partially developed mine in submarine territory which has been carried on as a prospecting operation in recent months, and will put the miners into other collieries. The information gained as to the quality and extent of the submarine coal in the Waterford district is stated to be most encouraging, and it is probable that a new opening in this vicinity will develop the series of coal-seams by means of a deep shaft and a rising cross-measure drift, in the manner that is now recognized as being the most practical and economical way to develop the submarine fields. In the Waterford district, also the consolidation of coal areas achieved by the British Empire amalgamation gives to one company the entire control of all the seaward coal to the extremest limit of mining operations as this may be determined by the physical conditions encountered. Under the previously existing arrangement of coal leases the Dominion Co. had lease of only the first two miles of seaward coal fringing the shores. This was a decided technical weakness, as it did not permit of such capital expenditures in preparation for coal extraction during the projected life of the leases as becomes both necessary and justifiable when all the seaward coal is available. In the Waterford district, the coal seams are present to the full extent of the series so far as they are known, and, presumably because of the conditions of original deposition of the coal-seams in the centre and least disturbed area of the Sydney coalfield, the seams are thicker and of better quality than in those areas which approach the shore of the Carboniferous sea and the source of the Coal Measure sediments. The Waterford district will eventually become the most important productive area of the Sydney Coalfield. The workable coal-seams are probably not less than five in number. The inclination of the seams seawards becomes much slighter at about a mile to sea, which means that the superincumbent land and water cover will not hamper mining by its weight to an insuperable extent, and the sea frontage between the subordinate folds in the main field ensures an uninterrupted territory probably eight miles wide, with an indefinite seaward extension of the seams.

PORT ARTHUR NOTES.

By J. J. O'CONNOR.

Voting on the By-law to confirm the sale of two hundred acres of water-front property, to the Palatine Mining and Development Company, by the City of Port Arthur, will take place on the 27th. instant. This sale was made for the sum of ten thousand dollars, subject to the votes of the qualified ratepayers. It is confidently believed that the By-law will be carried by a handsome majority.

This tract of land has a frontage of 1650 feet on the shore of Thunder Bay, and includes a water lot containing 83 acres, situate immediately north of Bare Point, within the city limits. It is expressly understood and agreed that the lands and premises are to be used for industrial and manufacturing purposes only, and that no dwelling houses shall be erected thereon. The purpose of the company in acquiring these lands, is to locate an iron steel plant together with associated industries, requiring large waterfront facilities, and a large land acreage for the erection of buildings to accommodate their scheme of development.

The Palatine Mining & Development Company now control about 2,500 acres of iron-ore lands in Cook county, Minnesota, which includes the Paulson nontitaniferous deposits. The company is now securing estimates on ten thousand feet of diamond drilling, to be done on these lands, other than the Paulson, where the company plans to begin mining soon as practicable.

It is the intention of the company to use the Paulson ore in the furnace at Port Arthur, which is now under its control, and is being rapidly modernized preparatory to being put in blast. The company has acquired the furnace under a four year rental option to purchase. The purchase price has not been given out, but is generally understood to be about $800,000. The improvements to the furnace call for a considerable initial expenditure, to place it in condition for production.

It is understood that the company are now making arrangements for an ore supply, to be used in conjunction with the Paulson ore for a furnace mix.

Actual development work has been started by the Islet Exploration Company, on the famous old Silver Islet Mine. Drifting was begun on July 1st. at a depth of two hundred feet, from what is known as the old fourth level, good progress is being made. This drift is headed west, in the direction of Shangoinah Island.

A shaft is being put down on a vein containing massive arsenical silver, on Edwards Island, nine miles east of Silver Islet.

Northern Ontario Letter

THE SILVER MINES.

The Cobalt District.

Economic conditions are steadily moving toward a solution of the difficulties which forced a curtailment of operations at many of the world's silver mines during the past year. The price of the metal having fallen almost precipitately during the past eighteen months, the operators found themselves in an exceedingly difficult position, especially because the price of supplies used in mining as well as the cost of labor did not decline to any very marked extent.

While the cost of material commenced to decline soon after the slump in silver quotations, yet the decline was not very pronounced. This resulted in the wiping out of what otherwise would have been a reasonable margin of net profit. The end was that a number of mines in a comparatively weak physical and financial position were compelled to close.

During the past few weeks, the decline in the price of material used at the mines has been going down more rapidly than any time on record. Dynamite has declined $4 per hundred pounds since December last, the price now being $17 per hundred for 40 per cent material as compared with $22 last Fall. Machinery, chemicals, lumber and all building material is declining rapidly in price, some of the machinery going down more than 25 per cent during the past two months.

Features in the silver mining situation are these: The price of the metal came down in "waves", so to speak, and settled at around 60 cents an ounce. Some time later, after considerable hardship had been experienced by the mining companies, the price of supplies commenced to also come down in waves, at first small reductions but now reaching proportions which promise to strike a more reasonable balance as between the cost of producing silver and the price which the metal commands on the open markets. All of these re-adjustments carry favorable tidings to the stockholders of mining companies owning property in the silver fields.

The Kerr Lake is encountering good ore at the 9th level, at a point about 125 feet beneath the lower contact. The silver occurs in small stringers about half an inch in width, assaying about 300 ounces of silver per ton. The company shipped a carload of ore during the past week containing 45,184 pounds and carrying approximately 350 ounces of silver to the ton.

During the first half of 1921, the Bailey mine shipped approximately 6,451 tons of ore, in addition to which was a large tonnage of customs ore, all of which resulted in the Bailey Customs Mill realizing a gross earning of $68,936.77 for the half year. An official of the company declares that the known ore bodies are being developed and shipments of ore are being made daily from the mine. The underground work is referred to as being "most encouraging". For the month of June, the custom mill treated 4,150 tons of ore, of which 1,060 tons came from the Bailey mine itself. This resulted in gross earnings of $12,451.98 for the month for the Bailey mill.

In regard to the report circulated recently, stating that Malcom Lang, M.P.P. for the Cochrane district, had been approached by the Ontario Government with the offer of the portfolio of Minister of Mines in the Drury Administration, to succeed Hon. H. Mills, the correspondent of the Journal has received the following statement from Premier Drury: "There is absolutely no foundation in the rumor you mention, and Mr. Lang's name has never been thought of or suggested for an appointment under this Government."

At the annual meeting of the Beaver Consolidated Mines, Ltd., the former board of directors were re-elected. Frank L. Culver, president and general manager, told the stockholders that the mine is being kept in shape to re-open at short notice at such time as conditions warrant such a step. In the meantime, Mr. Culver stated that he would not draw any salary during the period which the mine lies idle.

Production from the Nipissing Mine underwent a substantial increase during June when the output amounted to $162,824, as compared with $142,036 in May. A feature of the report is that $25,560 in cobalt was produced as a by-product.

In his regular monthly report to the president and directors, Hugh Park, manager, says:— "During the month of June the company mined ore of an estimated net value of $162,824 (including $25,560 of cobalt metal) and shipped bullion from Nipissing and customs, ore of an estimated net value of $208,536. The value of the silver production was estimated at 59¾ cents per ounce.

"Underground developments continued to be about the same as they have been for the past few months. Most of the tonnage treated was obtained from the stopes, development work contributing a small amount.

"The low grade mill treated 6,580 tons of ore. The high grade plant treated 174 tons. The refinery shipped 352,749 fine ounces of silver.

A meeting of the Cobalt branch of the Canadian Institute of Mining and Metallurgy was held in Cobalt July 15th, on the occasion of the visit of Mr. Mackenzie, secretary. Among the subjects discussed were "Slime Reclamation" by Fraser D. Reid; "Present Status of Gold Coinage", by H. G. Mathewson; "Pottery Clay in Temiskaming", by Arthur A. Cole.

Elk Lake and Gowganda.

The proposed narrow-gauge railway through the Gowganda district is still hanging fire. The Ontario Government seems to have definitely decided not to lend financial assistance to the project. In the meantime, the promoters are still engaged in the endeavor to finance the scheme entirely through the private sale of bonds. It is intimated that the Drury Cabinet, having in mind the commission to be made on the sale of bonds, etc., feared among other things that Government assistance might be capitalized as government endorsement of the scheme as an investment from the point of view of individuals. Property owners along the proposed route are not coming forward with any assistance.

Ore and Bullion Shipments.

During the week ended July 15, two cobalt companies shipped an aggregate of three cars containing approximately 226,500 pounds of ore. This was made up of two cars containing 140,504 pounds from the Coniagas and one car with 85,996 pounds from the La Rose.

During the corresponding period, the Nipissing mine made two shipments of bullion, making up an aggregate of 113 bars containing 151,722 ozs.

THE GOLD MINES.

The Porcupine Field.

It is estimated that approximately 2,500 men are engaged in the mining industry of the Porcupine field, and that the total pay-roll is about $4,000,000 a year. It is estimated that the Kirkland Lake field employes about 800 men, with a pay-roll of over $1,000,000 annually. Of this total of $5,500,000 the producing mines pay perhaps $4,000,000. A shipment of five tons of ore will be made shortly to the Temiskaming Ore testing Laboratory, Cobalt, from the Triplex property situated in the township of Shaw, in the Porcupine district. This shipment is for experimental purposes in determining the process best suit to treat the ore should it be found in the commercial quantities.

Officials of the Porcupine V. N. T. Mines are engaged in an endeavor to raise some $200,000 for the purpose of reopening the mine and remodelling the mill. The company has 475,000 shares in its treasury which may be sold, either that, or a loan may be secured. The property is in a strong physical condition, the blocked out ore amounting to about $1,000,000.

Work has been commenced on the Big Dyke property, in Deloro township. At present, only a small force of men are employed in driving a tunnel, but arrangements are being made to carry on aggressive exploration. This company controls the McRae-Porcupine as well as the Pike Lake properties.

What is an "ill wind" to Canada in a general way in the form of adverse exchange of upwards of 14 per cent as between Canadian and American currency, is proving to be a boon to the producers of gold throughout the Dominion. The fact is that at this time, each ounce of gold which is produced in Canada continues to command the full standard value of $20.67 an ounce in the United States. This, in terms of Canadian dollars and cents, is equal to approximately $23.57 an ounce. In a word, the gold mining companies in Canada are receiving a premium of approximately $2.90 an ounce for the gold which they produce.

Without careful analysis, the full significance of such a situation is difficult to measure in its bearing upon the gold mining industry as a whole. The added revenue is something which is adding to the incentive to mine gold ore. It is one of the laws of industry that profit and loss regulates its velocity. It is necessary that profit must be obtainable. Furthermore, the greater the margin of profit, the greater the effort put forward.

Then, to analyze the favorable influence which the present adverse exchange rate is having upon the gold mining industry of Canada: In the first place, the mines of the Porcupine and Kirkland Lake districts, in Northern Ontario, are producing gold at the rate of approximately 67,500 ounces monthly, or a "standard" value of between $1,350,00 and $1,400,000 a month. This standard value is received in full in the terms of American funds, which, in turn, when converted into Canadian currency, is increased by upwards of 14 per cent. That is to say, the mines of Northern Ontario in producing 67,500 ounces of gold per month, are actually receiving a premium at this time of $195,750 monthly, or at the rate of $2,349,000 a year. This sum, in addition to the standard value of $20.67 an ounce on which operations at the gold mines are based, is adding in an important degree to the incentive to produce gold bricks at maximum capacity.

To go still further, it may be well to note that in so much as the mines in the districts of Porcupine and Kirkland Lake contain an average of approximately one-half an ounce of gold per ton of ore, it follows that this premium of $2.90 an ounce on gold is adding to the value of the ore at the rate of approximately $1.45 per ton.

To grasp the significance of this still further, it is only necessary to keep in mind that the total cost of mining and milling a ton of ore in these districts ranges from $3.50 to $6 a ton. Indeed, there was a time in the history of one mine, that being the Dome, when the total cost was reduced to approximately $2.50 a ton. Keeping these facts in mind, it may readily be seen just now important is a premium of $1.45 a ton which is all net profit entailing no additional effort.

It is a fact that the pay-roll in the gold-mining industry of this district as a whole amounts to around $5,000,000 a year. The producing mines pay over $4,000,000 of this total, so that it may be seen that the current premium is actually at the rate of well over fifty per cent of the total pay-roll at the producing mines.

Having this fact in mind, Mr. Mackenzie, secretary of the Canadian Institute of Mining and Metallurgy, made the statement that the gold mining companies of the Porcupine district are not very keenly disposed to co-operate with a view toward reducing the rate of exchange. Mr. Mackenzie received this impression as a result of having approached the Porcupine miners with a view toward encouraging them to secure their coal from Alberta instead of going to the United States for it. "They seem to feel that they have the bull by the tail up there", said Mr. Mackenzie, "and take the attitude that this premium is only a fair reward for the adversities which the gold mines were obliged to pass through during recent years."

Kirkland Lake Field.

During the month of June, the Kirkland Lake Mining Company treated upwards of 4,000 tons of ore. Details are lacking as to the average gold content, but the average at this property may be figured at around $8 per ton, although for the past fiscal year, the gold content ranged between $6 and $7 per ton. Total costs, including mining, milling and administration amount to approximately $6 per ton.

At the Teck-Hughes mine, the mill has recently been treating an average of between 115 and 120 tons of ore daily, or at the rate of around 3,500 tons a month. The ore on this mine has recently averaged approximately $10 per ton, thus indicating an output of approximately $35,000 a month. This would tend to show net profits at the rate of not far under $500 daily.

During the month of June, the Wright Hargreaves mine produced approximately $51,000. About 25 per cent of the possible running time was lost, 16 per cent of which was due to power shut off and the balance to various causes. This enterprise appears to be shaping up definitely as the fourth largest gold mine in Canada, and an output of at least $2,000 daily seems to be assured. The mill has recently been treating an average of 150 tons of ore daily, and will probably reach an average of 160 tons a day. The ore contains from $15 to $16 a ton in gold, which would indicate a production of $2,400 daily when

running full capacity. The mine now enjoys the distinction of treating over a ton and a half of ore and producing approximately $25 every twenty-four hours for each man on the pay-roll. This is the highest production per man in gold-mining in Canada. Another fact of great importance which reflects favorably upon the judgment and efficiency of the management of the Wright-Hargreaves, is that during the first ten months following the completion of the mill, the mine will produce a greater gross value than the total cost incurred in connection with developing the mine and equipping it with the present big mining plant and one of the finest mills ever constructed.

During the month of June, the Lake Shore Mine produced more gold than during any previous month in its history, in spite of the fact that the mill was operated only 75.9 per cent of the possible running time. Production for June amounted to $52,539.92, this amount having been recovered from 1,656 tons of ore treated. These figures show that an average of $31.64 was recovered from each ton of ore treated. Features of the report are that this is the first time the mill heads ever exceeded the $30 per ton mark, the previous highest grade having been $29.98 per ton. It is also noted that the output for a single month exceeded the $50,000 mark only once before in the mine's history when $52,425.45 was produced in July, 1920. In an interview with R. C. Coffey, manager of the Lake Shore, Mr. Coffey stated that the No. 2 ore body at the 600-ft. level is looking exceedingly good, and stated that the loss of about seven days in the operations of the mill during June was the only thing whoch prevented a production of around $60,000 during the month. This loss of time was largely beyond the control of the management in that 16.1 per cent of the total running time was lost due to power shut-off on the part of the company which supplies the electric energy and the excessive fluctuations of the voltage burning out motors.

It is noted that the greater part of the work was done at the 600-ft level during the period, the report showing 99 feet of drifting and 29 feet of raising at the 400-ft level, while at the 600-ft level some 261 feet of drifting was done.

Heretofore it has been a quite general impression that the Lake Shore equipment could take care of the production of about $500,000 annually but, in the light of the June achievement, it would appear as though an output of between $600,000 and $700,000 could be taken care of.

Mr. Coffey stated that no milling additions will be made for the present other than perhaps speeding the present plant up to an average of about 65 tons daily as compared with a former capacity of about 60 tons.

MEETING OF COBALT BRANCH OF C.I.M.M.

A meeting of the Cobalt branch of the Canadian Institute of Mining and Metallurgy was held in the Board Rooms of the Temiskaming Mine Managers' Association, Cobalt, July 15. The meeting was the first to be held by the local branch since 1914, about 50 members and their friends being present.

Mr. Mackenzie, secretary of the Institute, reviewed briefly the status of the organization in all parts of the Dominion. Mr. Mackenzie has just completed a tour as far west as the Pacific coast, and declares that the Institute is in a decidedly healthy condition. He urged, among other things, that the local branches should be more aggressive. In this connection, the secretary had some suggestions to offer, based upon a survey of the entire field.

Reclamation of Slimes.

During the course of the evening, Fraser D. Reid, manager of the Coniagas mine, gave a ten minute talk on the "Reclamation of Slimes." Mr. Reid stated that his company had approximately 40,000 tons of the material to deal with, and took the matter with consideration at a time when silver was quoted at $1.30 an ounce. At that price, a substantial margin of profit appeared to be assured. The flotation process was tried, but gave only about 50 p.c. recovery. The price of silver began to decline, thereby necessitating improved methods. It was then decided, after careful experiments, to adopt the cyanide process, from which a high efficiency has been obtained, it now being possible to recover 5 ounces per ton as compared with the total content of 6 ounces. The total cost of re-treating the slimes approximates $1.50 per ton. The cyanide consumption amounts to about 2.8 pounds.

Status of Gold Coinage.

Mr. H. G. Mathewson, manager of the Cobalt branch of the Canadian Bank of Commerce, was requested to give a ten minute talk on the "Status of Gold Coinage."

Mr. Mathewson recounted the condition which had compelled the Canadian government to empower banks to issue bank bills as legal payment in discharge of promises to pay in gold, and stated that the government's action had avoided declaration of a moratorium. He enlarged upon the curious situations that the gold embargo had created in international banking exchanges, instancing that presentation respectively on a Canadian bank of a cheque for a hundred dollars on New York, of the same amount in U.S. bills, and U.S. gold coin to the value of one hundred dollars, would give the recipient $114 in the case of the cheque, $112 in exchange for the bills, and $100 in the case of the gold coin, all in Canadian paper currency.

Pottery Clay in Temiskaming.

Arthur A. Cole, Chairman of the meeting, and a former president of the Institute, spoke on "Pottery Clay in Temiskaming." Mr. Cole showed samples of clay taken from the Matagami River district, north of the Transcontinental Railway, which is rated as being the best grade so far discovered in Canada. The speaker illustrated his remarks with a piece of china manufactured from this clay. Other samples of inferior quality were shown, these coming from the Missinabi River, as well as near New Liskeard. Mr. Cole stated that the high grade clay of the Mattagami River district is without economic value until such time as transportation facilities may be provided, but referred with considerable optimism to the possibilities of this resource at some future date.

Following is the executive of the local branch of the Canadian Institute of Mining and Metallurgy, elected at this meeting:—

Arthur A. Cole, president; Angus Campbell, secretary; with H. A. Kee, M. F. Fairlie and G. C. Bateman on the council.

TORONTO MINING QUOTATIONS.

Quotations on Active Stocks on Standard Stock Exchange on July 20th, 1921.

	Ask	Bid
Silver.		
Adanac Silver Mines, Ltd.		7/8
Beaver Consolidated	26	25½
McKin. Dar.-Savage		15
Mining Cop. of Can.	1.50	1.00
Temiskaming		20
Trethewey		13
Gold.		
Atlas	19½	18½
Dome Lake	6	5½
Dome Mines	19.00	18.25
Hollinger Cons.	7.05	7.00
Hunton Kirkland G. M.	7	5½
Keora	12¾	12½
Kirkland Lake	32	31
Lake Shore M. Ltd.	1.25	1.16
McIntyre	1.95	1.92
Newray Mines, Ltd.	4½	
Porcupine Crown		13
Porcupine V. N. T.	17½	16
Preston East Dome	3	2¼
Schumacher	22	21
So. Keora	20	18½
Teck Hughes	11	10¼
Thompson Krist		4
West Dome	6½	5¾
Oils.		
Petrol Oil	30	18
Rockwood Oil, Gas	2	
Vacuum G.	5½	

METAL QUOTATIONS.

Following are the fair average prices for ingot metals (in less than car-loads).

	Cents per lb.	
Montreal.	July 13th	July 20th
Copper, electric	17 3/4	17 3/4
Copper, casting	17 1/4	17 1/4
Tin	35½	34½
Lead	6½	6½
Zinc	7	7
Aluminum	31	30
Antimony	7 1/4	7 1/4
Toronto.		
Copper, electric	17	16 3/4
Copper, casting	16 3/4	16 3/4
Tin	38	37
Lead	7	7
Zinc	1½	7
Aluminum	30	28
Antimony	9	9

Toronto, July 6th, 1921.

Canadian Mining Journal,

Dear Mr. Gray:—

I would like to draw your attention to the fact that the American Association for the Advancement of Science, the largest scientific and technical association in America, holds its annual meeting in Toronto in December next. Among its several sections is one on engineering, including mining and all other branches of engineering. It is to be hoped that our engineers will turn out in full strength at this meeting and make it a splendid success.

J. B. TYRRELL,

SILVERTON MINE SOLD.

The Standard mine at Silverton has been sold to New Yorkers for $75,000. The operating company has paid $2,700,000 in dividends and has a substantial cash surplus which will enable it to purchase and develop another mine.

IMPROVING SHININGTREE ROAD.

The waggon road from Westree to the Shiningtree gold area is being improved this summer. The greater part is in first class condition and a gang of forty men are now at work on the unfinished part. There will soon be a good gravel road from rail to mines.

EDITORIAL

The Search for Oil in the West

Mr. Alexander Gray, in this issue, reviews the search for oil in the Great Plains, the Alberta Foothills, and the drainage area of the Mackenzie, from the standpoint of the oil prospector. The review discloses how very wide has been the rake of the Imperial Oil Company, how thoroughly it has tested a continental area for the presence of oil in commercial quantity, and how large the capital expenditures incurred have been, especially in view of the slightness of the reward to date. The meagre appropriations of the Geological Survey have been handsomely supplemented by the operations of the Imperial Oil Company. Our geologists now have actual bore sections to work on, and a store of precise knowledge that never could have been gained with the staff and money at the disposal of the Survey. It is intimated that the precise knowledge gained by a series of borings designed to prove the position of the rock formations will necessitate some revision of the geological maps, so far as horizontal extension of the named formations is concerned, a fact that is not in the least surprising. As to the existence of structural features favorable to oil accumulation, it is difficult to see how even the most accomplished geologists, given ample time and funds for intensive study, could map these, without the aid of borings, in a country with prairie topography. So far as we have been able to glean from the reports of those officers of the Survey that have been detailed to work on the oil geology of the Great Plains, they have never held out any other hope than that this great area of undisturbed sediments was worth a systematic testing for the presence of petroleum, and there has been very evident on several occasions a tendency to criticise the officers of the Survey as lacking in optimism. Whatever may be misconceptions and shortcomings of the non-technical administrative departments of the Government, it will be generally admitted by those who have followed the reports of the Survey that these have been remarkably correct, and such forecasts as have been made have been strikingly confirmed by the precise knowledge that can only come from boring.

It may also be inferred that if the administrative departments at Ottawa had asked its scientific officers to tell them honestly, on purely technical reasoning, how best to utilise the oil that may be found in the Mackenzie Basin, the existing regulations would not have been framed. The statutory lease area, not being related in any way to geological structure or to the peculiarities of a fluid accumulation, is entirely illogical. As it is evident that oil can only be won from the Far North by rich and experienced corporations, the encouragement of small operators by provision of small lease units and the prohibition of grouping of claims (now modified) is also illogical. If the Government desired to hold fast to its possession of the oil-lands, it should have let out their exploitation to the most competent contractor putting in a bid. If, on the other hand, it desired more than anything, speedy production of oil in quantity, it should have given to some large and established oil company a concession sufficient in area to justify the very onerous capital expenditures that oil prospecting in northern Canada entails. If oil is found in the Upper Foothills, and in the Mackenzie area, the regulations as they stand will result in creating individual possessory titles to tracts of oil-bearing country. In the course of transference of these claims to the large oil companies that will eventually control the oil production of the North (should it materialise) some individuals may gain wealth by dealing in oil-mining rights, but this pernicious evolution will not help oil production. On the contrary it will defer the opening-up of productive areas and will increase the price of oil to the ultimate consumer, who will someday pay, not for the cost of producing oil as a physical operation, but for the over-capitalization of the industry by the creation and disposal for profitable prices of a host of possessory titles that will quite unnecessarily have been created.

WE had always supposed that the traditional incompatability of opinion between the East and the West was a Canadian idiosyncrasy, but the debate in the House in the United States upon the Fordney tariff bill discloses that this custom, like high tariffs and the class consciousness of the agriculturist, comes from the South. The "Boston News Bureau" refers in rather unBostonian heat to "the Western oligarchy in the House" and regards the tariff bill as "very pettish prejudice", which possibly its proponents feel "is a piece of revenge—retribution by the West upon the East."

It is a peculiarity of the development of North America, that, proceeding as it did from the settlement of white men on the Atlantic Coast, the East should have become urban and industrially developed before the West. From the standpoint of natural resources, however, when settlement shall have been completed in North America, the West is much better provided with the basis for the textile, shoe, iron and other industries that have played so prominent a part in the East, and it is a commentary on the times that the cry of the West for protection against the supposed tyranny of the East should have now changed to pleas from the East against western dominance. We believe there is no conflict between the East and the West, but only just a little discrepancy in date of development, and that future generations will laugh at a mentality which presupposed some necessary hostility between them. In the meantime, the great business of North American politicians, on both sides of the line, is to preach the essential solidarity of East and West, because they not only meet, but their interests commingle and are inextricably blended.

PEOPLE in Johannesburg seem to be greatly worked up over the declining condition of the gold mines working the Main Reef series, and there seems to be a very widespread disbelief in the State geologists, whose conclusions the "S. A. Mining & Engineering Journal" refers to as the "futilities of academic geology". This South African journal gives space in a recent issue to the opinions of pioneers and prospectors who urge investigation of reefs that are situated above and below the Main Reef, stating "the sober facts are that the majority of the mines of the Central Rand are well-nigh exhausted". Reduction of costs and improvements of operating methods so as to bring the large tonnages of low-grade ore within the possibility of profitable mining are urged, as well as thorough proving of the various auriferous zones of the Witwatersrand "which have hitherto been disregarded simply be- " cause the predominance of the Main Reef series has " cast the various reefs of the auriferous tract into in- " significance."

It is unfortunate when the mining circles of a district that is wholly dependent upon mining lose faith in the opinions and researches of government geologists, and it is a fairly sure sign that there is something requiring to be remedied when this takes place. The geologist and the prospector must work together, and each is seriously handicapped if they do not. The geologist may possess great knowledge and much scientific intuition proceeding from that knowledge, but when he attempts to dogmatise on what may be found in the earth's crust without the aid of a drill-core, he is after all only an intelligent guesser. The diamond drill is the finest assistant that was ever given to geologist and prospector alike, and the three combined are usually required to give that knowledge which perfects opinion.

Instances have been known of scientific men persisting in an opinion long after that opinion had become untenable, which is one of the proofs that a scientist is human. Prospectors and amateur geologists often hold opinions that convince the scientist of the truth of the dogma of original sin, but it has often happened that the academic geologist would have benefitted and he impartially examined these unorthodox opinions.

It is a fortunate circumstance that in Canada we have come to look upon our Geological Survey officers as the safest of guides, and it is one of our national traditions that the geologists of the Survey should see the unprospected areas of Canada first and suggest to the prospector where he should look for mineral wealth. Unfortunately, the appropriations of the Survey have not allowed it to revise some of the maps of mining territory where industrial development has been large and rapid, but when any new mineral discovery is reported in Canada our friends at Ottawa can usually turn up a Survey reference of respectable antiquity.

PERSONALS.

Mr. Charles A. Richardson, manager of the Chambers-Ferland mine, Cobalt, is on his way to England. He will be in London for a few weeks.

Dr. G. A. Young of the Geological Survey is at Moose Factory on his way to the Belcher Islands. According to reports reaching Toronto, Dr. Young has been delayed by loss of his equipment when a sailing vessel on which he was a passenger struck a reef on its way from Albany to Moose Factory. Eighteen persons on the boat all reached shore safely; but instruments and supplies suffered and will have to be replaced before the expedition leaves for the Belcher Islands. Dr. Young and his party will make an examination of the iron deposits, which have been reported on by Toronto and American mining engineers very favorably.

Col. David Carnegie, who was a member of the Munitions Board in Canada during the war, has recommenced private practice as a consulting engineer in London. Col. Carnegie, in addition to his experience as an ordnance and metallurgical engineer, has always taken a deep interest in industrial arbitration having, it will be remembered, read a paper on the Whitley Scheme before the Canadian Mining Institute during the war and he is prepared to give advice and personal services in arbitration work.

What Canada's New Oil Fields Have Disclosed

Millions Being Expended To Prove Their Worth But Results Thus Far Are Not Arousing Enthusiasm, Although Much Remains To Be Done.

ALEXANDER GRAY, Montreal.

How much oil in commercial quantities is going to come out of the Canadian Northwest—anywhere and everywhere in that Great Last West—between the Cypress Hills and Milk River areas near the Montana boundary and the place where Dr. Cook said he was?

Quite a few would give a good deal to be able to intelligently respond to that poser. Millions have been spent by the enterprising scientific field forces of the Imperial Oil Company. Smaller sums have been forthcoming from other companies. More millions are being devoted by the Imperial Oil Company to determine the merits and demerits of possible or impossible oil horizons, from Coutts to Fort Norman, and from the Peace Coupé across into Saskatchewan.

It was these expenditures, the presence of a fine organization, the participation of numerous syndicates and scientists—the manifest purpose of the Imperial Company to develop a Canadian oil supply — as a matter of patriotic duty as well as to serve their own chain of refineries—that prompted a trip to the centers of exploration. To have an oil field, or series of fields, would be an achievement of such great moment —the solitary Fort Norman well having provided a measure of confidence—a suggestion that a visit to the Northwest might be informative, was availed of.

Interior Department bureau chiefs have maps, reports—and a bewildering series of Regulations—each in seriatim disorder being designedly helpful from the Government viewpoint, and effectually confusing from the public standpoint, if not disconcerting to those who wished to ascertain where oil is likely to be found—and to go after it. Admonitory bulletins embraced the statement of fact that there is so many square miles—hundreds of thousands of square miles—of probably oil-bearing country in the Mackenzie River basin and elsewhere. The archives held the reasons for that generalization. Nothing could be more roseate, in perspective. Land there is a'plenty. As abundant as Orders-in-Council simultaneously imposing rentals, restrictions, royalties—and revocations — singularly unmindful of the difficulties and 60 degree below temperatures and the brevity of working seasons. Having summarily concluded that the Northwest Territory and Prairie Provinces are a vast Oildorado—no doubt with laudable intent—the department of the Ottawa Government having jurisdiction inferentially conferred a halo upon so much country that a journey over the prairies from east to west, and then cross-sectioning them, causes one to ponder upon the frailty of human foresight—even though it be official.

It is not the fault of Canada's transportation systems that such a swing around the great circle in mid-Summer is not a rest cure. The roadbed and club-car accommodations of the berated Transcontinental—the luxuries of the Grand Trunk Pacific, made all the more enjoyable by observation of bumper crops in the making throughout Alberta and Saskatchewan—the excellence of the Canadian Pacific service—the buoyancy of the West in the prospect of a bountiful harvest—all should be tonical to the wayfarer in quest of oleaginous inspiration—but the crop of inspiration was short of requirements. Volubility about growths, speculation as what those crops will bring—15c eggs and 20c butter at Medicine Hat—were on the conversational menu. Oil developments are little thought of outside of a limited circle in Edmonton and Calgary. The man who came by the Macdonald hotel, at 7 A.M., with a handful of young wheat tenderly wrapped, who stopped me and remarked: "There's no use in talking. That is wheat soil" was unconcerned with oil. He said the plant had grown two inches over Sunday—it was Monday morning. If I mistake not, with perfect sincerity, he had seen a growth of four inches over a week-end.

So Ottawa need not have feared there would be a *furore*—that the Fort Norman event would precipitate another orgie. Likewise the precautionary Alberta legislators who prevented the passage of pipe-line legislation lest it foster an imaginary monopoly, could not extend their range of vision beyond the long grass. Instead of overtime on printing presses, to meet the demand for script, there is industrial lassitude—the few who can afford to exploit remote areas on the off-chance of producing oil, mostly reside in the eastern urban places which supposedly crave continuous control of western provincial mineral resources.

Apart from the crops, and the optimism which the Westerner breathes, moves and has his being in; beyond the activities of the Imperial Oil Company, some others, and Col. J. K. Cornwall, D.S.O., there is very little that is enervating to the opportunist and adventurous. Collections are slow. The break in commodity markets put a crimp in the agriculturist. Pat. Burns frankly admits he thought he was a race horse but finds he is a draft horse. Sleek cattle and well-bred horses are pasturing in a wealth of grass. There is a market for bonds. Coal mines are working three and four days a-week. If there was money for speculation in oil acreage, the Calgary "boom" cured many of the oil habit. Incontinental real-estating and the frantic rush for oil shares during the Calgary episode, obviated the necessity of Ottawa guarding against a plethora of lithographed paper—even if the isolated Fort Norman Well be all it was and is represented to be by those who have least to do with it.

Col. Cornwall At The Front

Leases are plentiful, however, Calgarians, though, are disposed to be "Missourians"—and are not throwing bouquets at whatever may redound to the glory of Edmonton. Optioneers at Calgary have a preference for Southern Alberta and more convenient sections in Eastern Alberta and Western Saskatchewan. Edmonton brokers, as a consequence, have combed American and Eastern Canadian cities for funds—Vancouver and Seattle not being overlooked—and the display of photographs of the Fort Norman "gusher", array of derricks at Burkburnett, samples of Devonian rocks, tar sands, etc., bear testimony to the local interest—slight as it is. What action there is in the oil movement, undoubtedly emanates from Imperial Oil Com-

pany offices, "Jim" Cornwall, W. Ross Alger, and the "pussy-footing" representatives of other large oil-operators and promoters whose purpose it is to tag on to areas acquired by those who have drilling outfits on their locations. And, by the way, what Col. Cornwall has not to do about keeping open the line of communication to the Mackenzie Basin, or anywhere else below or above the Peace River, has yet to be learned. Whether in command of a pioneer battalion in a dangerous sector, packing whatever has to be portaged *en route* to the sub-Arctic oil fields, boosting real estate or transporting all that is essential to far-northern operations, "Jim" Cornwall is ubiquitously efficient. Originally from Brantford, he became a handy man on the rivers and especially in the white waters of the region now being adventured. Manipulating the wheel, steering clear of lurking rocks and getting there, he made a reputation for intrepidity as a riverman and a mail carrier, a duty which involved mushing it when the thermometer was bumping on bottom.

With his dogs it was the same. He broke trails ahead of the dog teams, or followed them with the gait of an Indian. From cooking and making camp at temperatures that would break the nerve force of the bravest, "J.K.", graduated in fur trading and freighting, eventually becoming a political leader and a capitalist. As a matter of course, men of his temperament are impulsive and optimistic, consequently when he was not opulent he was the opposite. But "J. K." always has been an essential element in the boosting of the Northwest—and what he made in the Calgary excitement he put into other things—which frequently has left him more time than anything else on which to ruminate. Just now he is sharing the transportation business from the end of steel to the end of creation, as it were—and incidentally he has promoted several companies whose purpose it is to explore areas for oil. One of these companies is the Northwest, with which W. W. Butler, Senator Curry, railroad officials, and a number of other Montrealers are identified. Possibly Col. Cornwall is more of an enthusiast than an expert in oil country—and it is said some of his equipment is unsuited to immediate results at the sections where he is seeking oil. That, though, will not dampen his ardor. He plays the game like a true gamester, has his friends and does not care a whoop for the next fellow—all of which has made "Jim" Cornwall an Edmontonian when he is not north of where game laws are inapplicable. His Northwestern Oil company has pre-empted areas in the Mackenzie Basin and around Slave Lake—but that does not exclude him from his other enterprises, including the Great North Services Ltd., which contemplates the aerial transportation of passengers, dispatches, light freight and express packages to Fort Norman, Great Slave Lake, Ponce Compé and Peace River districts.

Col. Cornwall is an omnipresent individual and is doing his bit to further developments. Without the Imperial Oil Company, Col. Cornwall, the Hudson's Bay Company, the railways to the Peace and Fort McMurray, the generality of those who have the wherewithal to finance expeditions, would be on a fool's errand; for the restricted operating period is accentuated by the difficulties and hazards of transport. Besides rapids there is a sixteen-mile portage obstructing the all-water route. Rivalry exists as to which route has most advantages. If you go from Edmonton via the Dunvegan and British Columbia railroad for 312 miles to Peace River, you may appreciate not having to hike it, but the tortoise is a pace-maker compared with the speed at which the weekly or tri-weekly trains travel, on hurriedly-laid tracks, on which Pullmans and buffet cars afford relief. Down the Peace from the town of Peace River, it is a distance of 300 miles to Vermillion Chutes, which can be flanked by a four-mile trip by wagon. Further down the river is the town of Fitzgerald—a matter of 275 miles, from which point it is sixteen miles overland to Fort Smith on the Slave River. The uninitiated are admonished that there are dangerous rapids between Forth Smith and Fitzgerald, but from the former it is all down-stream, a fact which lends an element of fatigue to the return journey, whether by Hudson's Bay, Northern Trading, Alberta and Arctic Trading or Lawson & Hubbard steamboats. Another route via Fort McMurray and the Alberta Great Waterways Railway, means a distance of 290 miles by rail, thence 285 miles to Fitzgerald. Either way is the "highway to wealth" at the moment—and neither is open long enough for the tourist to linger. Navigation on the Peace, Athabasca and Slave Rivers begins in the middle of May and continues until the middle of October—but there is very little open water in the Great Lake before the first of July—and that limits communication to less than four months. Under the most favorable circumstances the trip to Fort Norman can be made in six weeks or two months.

How the Oil Movement Started.

Since 1870, if not before, the likelihood of finding oil on this portion of the practically uninhabited end of the globe has been discussed. At that time Sir George B. Dawson told the Senate at Ottawa there was oil up there. Dominion geologists emphasized the significance of the Athabasca tar-sands and seepages; a "gasser" or two added confirmation of a kind. Prior to the War attempts were made at drilling. The Calgary experience, however, took the edge off such explorations, notwithstanding Calgary had natural gas and a small production of oil was and is being obtained. Von Hammerstein got gas at Pelican Portage before the War. The Shell Transport and Trading Company sought a comprehensive concession that would give them the right of selection. It was fully realized Canada needed an oilfield, because importations of crude and the high adverse rate of exchange against Canada were becoming so formidable that President Stillman of the Imperial Oil Company announced to his shareholders they must leave nothing undone to provide a Canadian source of crude. Bringing in from 250,000,000 to 300,000,000 gallons of crude, and petroleum and petroleum products to the value of from $40,000,000 to $50,000,000 had its disillusionments.

Right there is where the whole thing started—culminating in the bringing in of the Fort Norman Well—something like 1900 miles from Edmonton by the round-about route. How much that well is going to yield when the gauge is on it, as yet is a matter of guesswork. The net result of two years of aggressive effort and an outlay of more than has been made public, was one reputed "gusher" in August 1920. And Dr. Bosworth is to praise or to blame for it. Whichever it is, shortly will be known. Dr T. O. Bosworth happens to be a pole-to-pole person. As a geologist he became interested in the Athabaska Sands—the "Tar" Sands—which have been the object and subject of concessions until the solitary certainty concerning

them is that not a thing can be done with them, even though the superficial area over which they have been noted might be tempting to capital—when a feasible process has been devised. Dr. Bosworth impressed upon the Imperial Oil Company the advisability of paying heed to the indications prevailing throughout the Northwest Territory, and in Alberta where a little oil and considerable gas had been found. Dr. Bosworth also favored drilling the "tar"-sand sections. Consequently, Vice President A. M. McQueen, accompanied by Dr. Bosworth, went up and down to the frigid haunts of the Yellow Knife Indians, and philosophically enabled the full-grown mosquitoes and bulldog flies to transfuse considerable of his rich, red blood. Contemporaneously Mr. McQueen ran short of gasoline a time or two—and the trader who helped him out of his difficulties chuckles to this day at what Mr. McQueen remarked about the price per gallon for what he needed for his own launch. Mr. McQueen told the trader there would be cheaper gasoline in that bailiwick, one of these days. He meant every word of it—and of what he did not express.

Mr. McQueen neither has kept his word to that Bolshevik, nor made good his implied threat to cheapen gasoline in that neck of the woods. If potato spirits would do duty either in aeroplanes, launches, or the flat-bottomed floating palaces which correspondents are describing, there is a portion of the Peace River country where they raise as much as 400 bushels to the acre. Unfortunately there is a limited local market for potatoes—for any purpose—and in this connection it may as well be admitted that the Alberta Government was somewhat ahead of the age in which the Peace River will be within range of markets. In 1907 assisted passage was given by the Alberta Government to a number of what looked like desirable settlers. Land was taken up by those agricultural scouts. This land and quite an acreage besides, has the finest sort of soil, a rapidly-growing season and all the attributes of prosperity—excepting an accessible audience of consumers. Rod Mackenzie is the most active spirit at the moment—unless it be "Jim" Cornwall and the others who are bossing the rivermen and pushing scows to their destinations.

Peace River is splendidly Arcadian—for a fraction of the year—when sixty-day grain is growing throughout a twenty-four growing day. There the analogy ends. The man last year who took 8,000 bushels of grain to market—at a cost of 28 cents a bushel—and got less than cost a bushel for it—learned more about economics than is discerned by the average adventurer whose perspective is blurred by adjectival descriptions of the "wonderful" Peace River section. Conceding to Peace River its wealth of soil and ability to raise crops on the double-quick—it is not an impertinence to assert that "it is all dolled up and no place to go." Settlers exist. Should the oil fields fulfil the glowing prospectuses, all the more credit to those who went there and stuck it—and many of them are Americans.

Where Geologists Went Wrong.

That discursive paragraph was interjected because Mr. McQueen and Dr. Bosworth, along with their Imperial Oil principals, have a good deal to answer for. Dr. Bosworth was *connaissant* as to oil. Mr. McQueen, acting for his people was willing to be shown. Up and down the serrated fringes of the Arctic, across fish-laden lakes, Mr. McQueen and Dr. Bosworth, in their launches, or mushing it, may have felt Cleopatra in her barge had a shade the best of it—but they were in quest of the barrel of oil at the rainbow's tip—and realities.

That was in 1917—Dr. Bosworth also was a landed estate proprietor, holding areas at Great Slave Lake and other auspicious points. So impressive was the rock doctor, he and his associates disposed of his holdings to the Imperial Oil people. Having paid this admission fee there was nothing to it but for the Imperial Company to take the title to other areas. Rival undomesticated great oil-corporations would have made a globular preserve of the northwest—and were prepared to expend half-a-million or so on explorations. When the Imperial executives, however, propelled themselves into the situation they could hardly have foreseen what it has cost their company to get what they have territorally, although the Fort Norman Well, let it be understood, is an altogether inadequate compensation.

Drilling around Fort McMurray and elsewhere was unprofitable, in 1917. Eugene Coste had a hold on the Government Reserve in the Viking Field in Eastern Alberta. Co-operation with his was attempted. The Coste Natural-Gas Company was proferred what gas was found—the Imperial Company was to have all the oil that might be tapped. Nine wells in all brought in gas—but somebody cast monkey wrenches into the machinery of this arrangement—and the gas-wells available for Edmonton remain capped. For this, various explanations are offered—the most probable being that the owners of privileges in the Reservation preferred to leave well-enough alone—they had gas—they might not get oil—and they might get salt water that would be decidedly detrimental to the gas wells. Then the section around Czar was spotted, after things had slowed up.

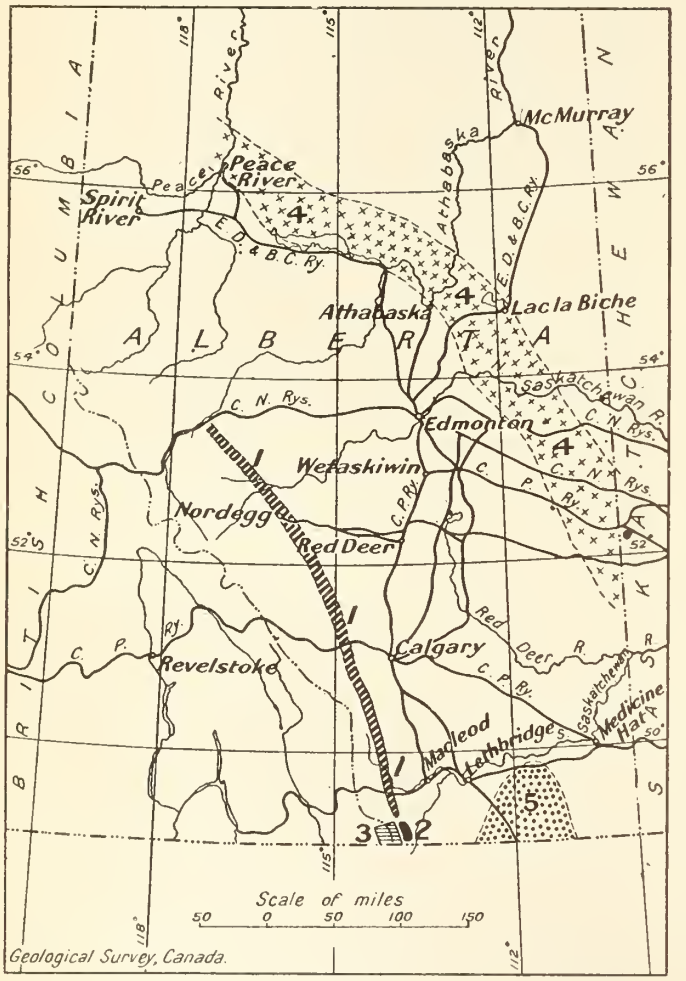
That was the introductory to a chapter that promised to be a romance. It has developed into a tragedy. For ever so many years the Department of the Interior has preserved sacred reports and cherished a "base map from engraved plates of the Department of the Interior. Geology compiled from published and unpublished maps of the Geological Survey." Nothing in the archives was more sacred than this map. It covered the territory between Chipewyan at or about 58 degrees north latitude, to the Montana boundary, and from the Rockies to Lake Winnipeg. Dawson, his contemporaries, and some of their successors, accepted as their geological gospel the mapping of the Edmonton Series, the Pierre—without identifying lower Pierre in places—the Belly River formation, the Benton shales, the Dakota and Kootenay sections, Devonian, Ordovician, Athabaska sandstone—and whatever could be defined. A great splotch of green from the Beaver Hills to Oban, thence south to Saskatchewan Landing, southwest to Medicine Hat, and then curving around past Lake Pawkoki to the international line, was plotted as Belly River formation. East and West of this Belly River area was placed the Pierre and Foxhill, and the La Biche and Foxhill. Cross-sectioning this area and running northeast through Hardisty, is the Battle River. Thereabouts is a series of "domes"—construed to be structural—generally extending from the Beaver Hills, on through the "Tit" Hills to the Misty Hills.

Authorities—not all of them—seemingly assented to the deduction that those hills were structural, therefore possible oil horizons. The Viking and Irma gas fields rather sustained this view, in recent years. Nothing, therefore, was more natural than that Im-

perial Oil geologists should lay in a supply of this "Battle River Anticline," as it came to be known.

Right on the anticline the Imperial company squatted —and Ralph Arnold of California—with a reputation for alertly picking land with a chance—hitched on the Imperial star, not proposing to be lonesome. If anything, Arnold had a shade the best of it for squatting capacity. He began at Birch Lake, kept spreading out until he got to Coste's reservation—and then stuck closer than the proverbial brother to the Imperial acquisitions around Czar and Monitor—all the way to the Misty Hills.

Anyhow the Imperial, Calgary Gas (Coste), Arnold, and a few wise ones, rode that anticline for all it was



Index map showing the areas in Alberta where prospecting for oil is in progress.

1. Outer edge of foothills.
2. Elevated Belt in front of Lewis and Clark ranges.
3. Lewis and Clark ranges.
4. Terrace structure along northeastern border of Alberta syncline.
5. Bow Island anticline.

(Cut kindly lent by Geological Survey.)

worth. Mr. Arnold organized as many syndicates as he has fingers, almost. The members, or subscribers, knew him to be prudent and scientific in making selections. That "Battle River Anticline" had a larger liability against it right then than Dawson or his heirs in the Dominion Survey ever thought of. To all appearances, reckoning from the gas wells to the northwest, the hills contained treasured oils—over half a million acres was ripe for "spudding." Mr. Arnold was only one of many who thought as he wrote in behalf of one of his organizations, on September 20, 1920:

"The lands . . . . embrace something over 160,000 acres, and have been selected by me after a personal examination of every locality, with one exception. I might say that the holdings of the company include acreage on fifteen different structures, seven of which are now being tested by wells already in operation, and on two or three more of these structures wells will be put down shortly by responsible companies. The land is held in compact areas—the most desirable type of holdings for development purposes. I, therefore, consider the holdings ideal from a strategic standpoint."

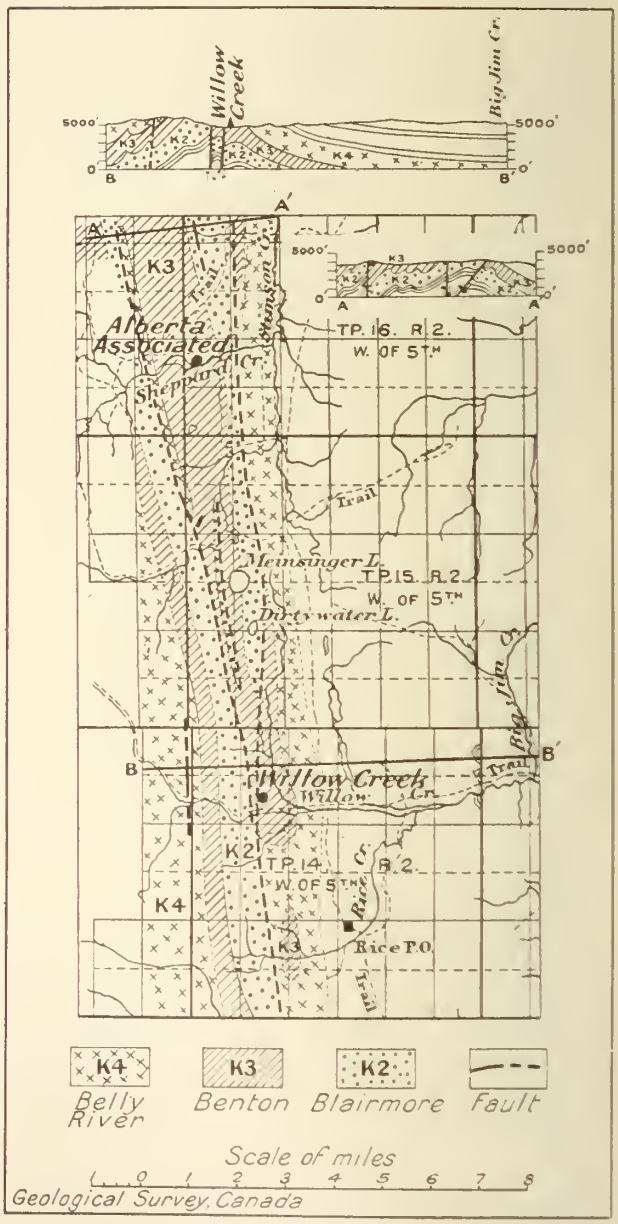


Diagram and sections of Sheppard and Willow Creeks, Alberta.

"I will not go into an extended discussion of the evidence which leads me to believe that the particular regions in which we are operating are destined to become commercially productive. I will state, however, that my examinations of the great tar sand regions of Athabasca, Clearwater and Christina Rivers are indisputable evidence of the presence of an adequate source of oil. The structure in general consists of a south-dipping and west-dipping mono-

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MISTY HILLS

Misinterpreted as Structural Indications.

cline which swings around from the region of Lesser Slave Lake into the regions of Birch Lake, Muddy Lake and Sounding Lake, and thence southward to the international boundary. Along a certain belt on this monocline are a number of minor folds which offer ideal conditions for the accumulation of oil in the underlying strata. Wells have been drilled to the gas sands at several points in this belt, and all have encountered commercial quantities of gas and some have yielded traces of high-grade oil. At Viking, where nine gas wells have been drilled, there is a potential capped-in supply of about 50,000,000 cu. feet per day. The owners of this company have a franchise in Edmonton, and the gas will be piped to that city as soon as pipe can be secured for the purpose. Small quantities of high-grade oil were encountered in three of these wells. None of the wells in this belt has yet penetrated the zone corresponding to the tar-sands of the Athabasca region to the north. I look for commercial quantities of oil in the oil-sand zone under these favorable structures just mentioned. The lands held under lease by the Northwest Oil Exploration Company of Canada, Ltd. cover favorable locations on most of the known structures of this belt and, as previously mentioned, development operations which will soon prove much of this territory are already under way."

"Recent developments in Montana in the southward continuation of the prospective oil-belt just described have shown the presence of commercial quantities of high-grade oil. Some of the wells in this Montana district are reported as yielding over 1,000 barrels per day. The results obtained in Montana certainly strengthen the belief that commercial quantities of oil can be found in the region under discussion."

Czar Hole Discouraging.

With an honesty of intent which no one who knows him personally and professionally, will call into ques-

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CHOCOLATE BUTTE

(Misty Hills South)
Illustrating one of the deceptive structures.

tion. Mr. Arnold further committed himself when he wrote:—

"A hole testing all horizons to the base line of Cretaceous will be not over 2,000 feet in depth, and should not cost more than $30,000."

"One hole, if sunk to the lowest probable horizon will prove or disprove a very considerable area of the dome."

This is "truth, strong as Holy Writ." One hole—the Czar hole—has wrecked data and official intelligence maps upon which the army of capitalists and their geologists entered the field. Salt water and no oil was encountered in the Czar hole, of which the log was:

Surface to 1,050—Belly River formation underlain by Lower Pierre;
1,050 to 2,900—Benton Shales;
2,900 to 3,250—Lower - Cretaceous Sands (probably Dakota);
3,250 to 3,500—Limestone.

Thus was the epitaph inscribed upon "a very considerable area," to quote Mr. Arnold's projection. The

TWIN BUTTE WELL
No. 2 of the Imperial Oil Co.

Czar hole penetrated below sea-level. Czar is at elevation of 2,234 feet above sea-level. The other points in this vicinity at which drilling is proceeding, are Monitor and Irma, which are situated 2,219 feet and 2,000 feet respectively above sea-level. Ranfurley, to the northwest, is at elevation of 2,150 feet. There another of Mr. Arnold's organization is drilling. But the Czar hole, and what thus far has been noted in three holes near Monitor, relegates to the scrap-heap the hopes of those who shared the view of Mr. Arnold, to this effect.

"Tit Hills district is underlain by two and probably four probable oil-horizons, all of which are believed to be within reach of the drill."

As there are no horizons, and as the Czar hole demonstrated that the "domes," or "structures" are mere "erosion remnants," one of the most revered traditions entertained by non-technical departments at Ottawa has gone a'glimmering.

The Czar Well has given eastern Alberta a casualty list which conveys more than a moral—but the Government hardly will return the money received as acreage taxes. A slender hope remains that the hole now going down in Imperial Oil Company ground at Irma will strike it— but the hope is an almost forlorn one. Rather than abandon its entire acreage on this Ranfurley-Monitor line, the Imperial field parties will give this Irma area a final try out.

It was in this area what is known as the Grattan Well brought in a "gasser" at a depth of 1,900 feet. The intention is to put down a new hole below the gas vein, and to the base of the Cretaceous Sands. Upon the result rests the fate of the whole legendary "Battle River Anticline"—and a huge section of the Alberta prairies—too huge to be at all agreeable.

The experience gained at the expense of the Imperial-Arnold-Dumm forces will be profitable as an object lesson. Victims of deceptive contours—of what looked like foldings—are entitled to a measure of sympathy rather than censure from those who subscribed money upon the assurance that characteristic structures existed. How widespread will be the application of this development has yet to be determined. Certainly the prairie section is to be liberally discounted—and that is why the Imperial Company crews are concentrating to the south of Calgary, near to the Montana line: at Ponce Coupé away to the northwest, beyond Grande Prairie, and on the Mackenzie, at Fort Norman—a solitary test being made in the Rush Lake area in Saskatchewan, on the Canadian Pacific line. What little is being done at Great Slave and Muddy Lakes in Saskatchewan is more a matter of duty than of design, notwithstanding the broad policy of the Imperial Oil Company to give Canada its greatest chance to become self-sustaining in oil.

Imperial Company Universally Helpful.

Not unnaturally Imperial officials are non-committal concerning these Czar happenings and their effects. It took two years to prove the Czar to be the center of a "lemon" patch, hence a reticence that is perfectly plain. Money has been spent in a sporting spirit sustained by capable technical staffs and equipment beyond the ken of those who appreciate what is involved in the exploitation of real or imaginary oil-fields. An army of drill crews: all the paraphernalia inseparable from such operations: a yard-full of piping and casing, derricks, "strings of tools" so as to be prepared for any and all emergencies—a thousand-and-one things—not including the commissariat and clothing outfits— have displayed the avidity of the Imperial Oil Company. A warehouse at Calgary is on the wire. A large machine shop and foundry manned by trusted employes who are as keen as their chiefs, supplies drill-crews on the hop with whatever is needed.

Nor are these facilities restricted to Imperial operations. Above all things the company wants production —and nothing to that end is left undone. Whoever needs piping or drilling materials in a hurry can have it. Without the Imperial forces those engaged in drilling would be handicapped. When deliveries by rail are too slow, automobiles are employed. What the Imperial does not possess, the Hudson's Bay or one of the other trading companies sends along. The fellowship is admirable. Undoubtedly the burden has been borne by the Imperial Company, thus far, notwithstanding glowing expectations emanating from the Fort Norman Well. Just what other interests, have, excepting the Whitehall Company, conferred watching commissions

upon representatives in the Northwest, has not been divulged to any extent. Royal Dutch engineers or geologists have given the country the once over. The Whitehall Company are supposed to be acting for another British corporation. Major Preston is supposed to be doing things for the Pforzheimer people. Turner and Talpey have dealt with a combination that can provide capital—W. B. Thompson, Jules Baehe, Seeley Mudd, Jackling, and others.

Yet there is no *furore*. The Imperial Oil Company are the greatest "wildeatters" the Northwest has entertained. Far from being reprehensible "wildcatters," they are noteworthily eonstruetive. Despite official geologieal date, nearly every well attempted has been of the "wildcat" speeies—and inevitably so—until the various areas are tested. Without "wildeatting"—not necessarily by means of money indiseriminately raised—oilfields everywhere would be much slower in reaching the producing stage.

Where Drilling is Proceeding.

Preeedence has been given to the *dénouement* at the Eastern Alberta-Ranfurley-Monitor section beeause it was intersected by three trunk-line railways, and the presenee of gas hastened its testing. If there was oil there, it would be commercially useful. Imperial Oil Production Department did not confine its efforts to that acreage, however. It disproved the Fort McMurray country. In 1919 it had 22 geologists in the fields, and all their investigations required. The Fall of 1919 notified the spotting of the Czar Well—and drilling started there. The Big Muddy area in the Porcupine Hills of Saskatchewan was located. An expedition was sent to Fort Norman, and another to Windy Point on Great Slave Lake. It took all of the Summer of 1919 for the outfits to get there. A crew was left all winter at Fort Norman. The Windy Point hole got down 300 feet, without indications. Incidentally arrangements were made with the Coste interests, as outlined, and the Great West Natural Gas Company,, holding ground on the bank of the Saskatchewan, 23 miles northwest of Rush Lake where a blank was drawn.

Drilling began in the Monitor section. Imperial ubiquity was in evidence. Uniform disappointment was recorded. When I was on the fields, the Rush Lake hole was down 1,670 feet, and in blue shale; the Muddy Lake hole was down 1,157 feet, and in shale, and the Monitor or Misty Hill hole, 940 feet.

Far Northern Areas to Be Proved.

The one bright spot in the Imperial drilling campaign was the Fort Norman Well, whieh was brought in at the elose of the 1920 season. At 783 feet the structure selected by the geologists qualifiedly proved its worth. In this eonneetion, it is no disparagement of the Imperial Company or the staff, to assert that the estimated produetion of the well may not attain to expectations, or representations. At the moment, a erew is *en route* to clean out the well and test it. Should its flush production eonfirm the estimate made by those who were present when the well was brought in, there will be fewer heartburnings. On the other hand, if the flow is not such as to arouse enthusiasm—considering the remoteness of the field—a revision of plans must ensue. Anyhow, the Imperial Company gathered a momentum that cannot be stopped short. Three standard rigs have been alloeated for further testing of the Fort Norman field—and other companies will supplement these. This season and next, it is officially stated, the Imperial will spend $400,000 to determine beyoun question whether Fort Norman is a whale or a sprat, as it were. Simultaneously, Windy Point, at Great Slave Lake will be attended to, the hole there having been left uncompleted last year.

IMPERIAL OIL COMPANY'S CHRISTIE WELL, S. W. ALTA. Showing structure west of Nanton.

To illustrate what these far northern expedition entail, it may be stated that 40 men will be at Fort Norman, fully provisioned and otherwise equipped for a stay of sixteen months, every reasonable comfort and safeguard, libraries, gramophones, and a doctor being taken along. While this is being said and done, it is to be borne in mind that the one big or little well at Fort Norman is economically useless—until produetion is increased sufficiently to suggest transportation facilities. The hope is that this season's work, to be participated in by Montreal, Toronto, Vancouver, and other companies, will settle all disputes as to the potentialities of Fort Norman. No one sincerely desirous of success is decrying the locality—and yet Fort Norman is responsible for between two and three million acres being leased. Aerial intercourse has been established between Peace River and way stations northward.

Nothing in this summary of the situation is deliber-

ately prejudicial to any district, interest or factor engaged in furthering development. Events have been too disconcerting to be at all agreeable. That there will be more oil found—somewhere—confidently is expected. It will not be underneath the great stretch of Edmonton Series. Between the Kootenay section at Banff and the assumed uplift which really does not exist from Medicine Hat along the ill-fated "Belly River Anticline," the chance of reaching oil in the central section on a commercial basis is slender once you leave the Kootenay Shales. The one prospect appears to have been eliminated by the Czar hole.

Really, therefore, the expansive explorations of the Imperial Oil Company have been in the nature of a process of elimination. The horizontal academic idea that oil is likely to be as plentiful as the lignites and real coals of the prairies—that the oil horizons were widespread—has been discarded. It never obtained in well-informed quarters.

Even the Imperial Oil Company with all the data and book and map lore at their command has had to unlearn a great deal of what was stored away in their brain cavities—and that without weakening the purpose to continue its present policy until success—or failure— is assured. Which is admirable, if expensive. Should the Mackenzie River area prove up in quantity, there will be a consolation prize. As for Great Slave Lake and the Peace River, very little is being forecasted, lest more banks be registered. More testing will be done along the Peace River—not by the Imperial parties. They have other engagements—more propitious.

The Fort Norman Position.

According to Dominion and Alberta Provincial horoscopes there are "upwards of 300,000 square miles in Alberta, the lower Mackenzie basin, and Western Saskatchewan underlain by formations suitable for the accumulation of petroleum." This is accepted as a basis for optimism, even though "the problem of working out the structures in this area is extremely difficult on account of the scarcity of outcrops, the thick veneer of glacial debris, and the extensive muskegs." Naturally development of production can proceed only so fast. The belief has been that the possible fields are: Southwestern Alberta, Southeastern Albert, Okotoks, Central Eastern (Czar, Monitor Viking), Central Western (between North Saskatchewan and Athabaska rivers within the foothills), Peace River (lower), Peace River (upper), Great Slave Lake, and the Lower Mackenzie (Fort Norman). Leaving out the Czar, Viking, Monitor area, for reasons already stated, and setting aside the lower Peace River section which has been tested; pending further proof of the existence of oil; while awaiting something more tangible than is forthcoming from the western end of Great Slave lake—there remains more than sufficient territory to occupy the attention of capitalists and scientists for some years to come. Nothing like a final judgment as to the Great Slave Lake region will be put on record until the Imperial and Northwestern Oil Company test holes are completed —and more is known from other sources. Of the Lower Mackenzie, where folded Devonian rocks were noted, Dr. T. O. Bosworth, who spotted the Fort Norman hole as far back as 1914, says:—

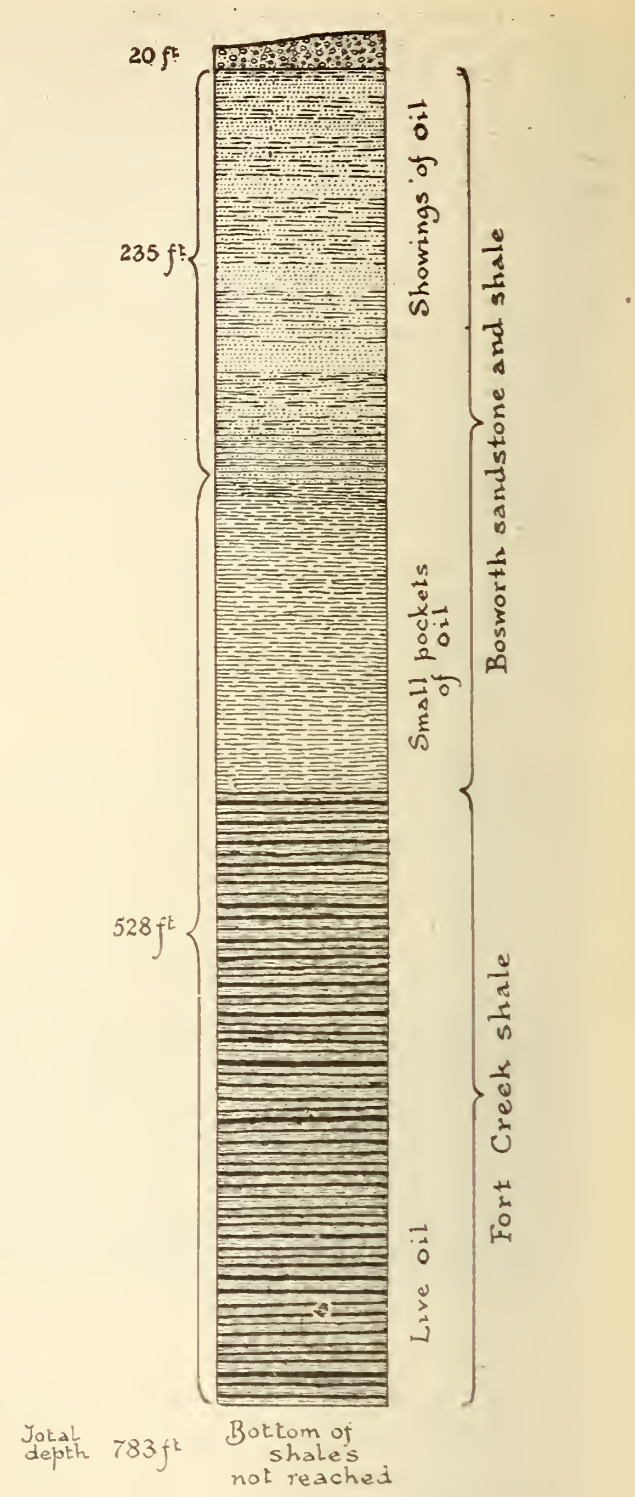
"At Fort Wrigley, Rock-by-the-River-Side, etc., the river is in contact with outlying parts of the Mackenzie Mountains, and here again folded Devonian rocks are visible.

"From Fort Wrigley to Fort Norman the river proceeds on a N. N. W course for some 130 miles, gradually drawing out of sight of the Franklin range.

"After passing Fort Norman the river comes in contact with another mountain system—referred to as the Limestone Mountains.

"These mountains, which consist of anticlinal folds of Devonian rocks, are encountered by the river for a distance of a hundred miles.

"It is in this territory that the favorable indications and structural condition were found which have led to the recent strike of oil. This is the site of the new oil field."



SECTION OF DISCOVERY WELL, FORT NORMAN
(Cut loaned by Geological Survey).

Dr. Bosworth places the "Discovery Oil Well' on the right bank of the Mackenzie river, some 45 miles beyond the little trading post known as Fort Norman, and within 90 miles of the Arctic Circle. Again quoting Dr. Bosworth:—

"The location of this first test well was chosen in 1914, as the site where a hole of moderate depth could not fail to penetrate the several petroliferous formations which had been found.

"The well is on the river bank about half-way down the Long Reach, near the mouth of Camp Creek, where there are copious seepages of oil.

"The well was drilled during the summer of 1921. Almost from the start oil was coming into the hole, and before a depth of 100 feet was reached a yield of five or ten barrels a day could be obtained."

At 783 feet "a strong flow of oil was encountered which spouted to a height of 70 ft. After about ten min. the well was capped. Some hundreds of barrels of oil issued from the well before it was finally shut in, but no dependable estimate of its capacity can yet be made. It is thought that the initial output will be at least 500 barrels a day."

This is the language employed by Dr. Bosworth. He estimates the flush production at 500 barrels. Other reports made it all the way from 1,200 to 1,500 barrels. That it was an important development, President Stillman of the Imperial Oil Company admitted—but mature deliberation does not concede the "initial output" at so large a total as Dr. Bosworth presents. No estimate has been "dependable." Analysis of the oil is satisfactory. The Imperial company has extensive locations for some miles along both banks of the river—and the map indicates they are not lonesome. Recently the Imperial Co. has taken over additional areas.

The Imperial company will drill on the north bank, further east—and will put down three more holes at points already selected on the north and south bank. Other holes are planned by Toronto and Vancouver companies so Fort Norman may have a series of wells at the end of this season. In a few weeks the "discovery" well is going to state the facts as determined by the gauge. That should clear the atmosphere. Most of the holdings are large enough if they are good enough. Dr. Bosworth has committed himself irrevocably in regard to the vicinity, as follows:

"The principal seepages occur on the shores of the Long Reach, where the river flows for 75 miles along the outcrop of the Camp Creek Series.

"Near the mouth of Camp Creek (which at first we called Oil Creek) the seepages are conspicuous for a distance of two and a-half miles. On digging in the river gravel the outcrops of the green oil-sands are exposed, and the oil could be collected in considerable amount. Further out in the river much oil rises up to the surface of the water, and in winter it collects, forming pools in the ice.

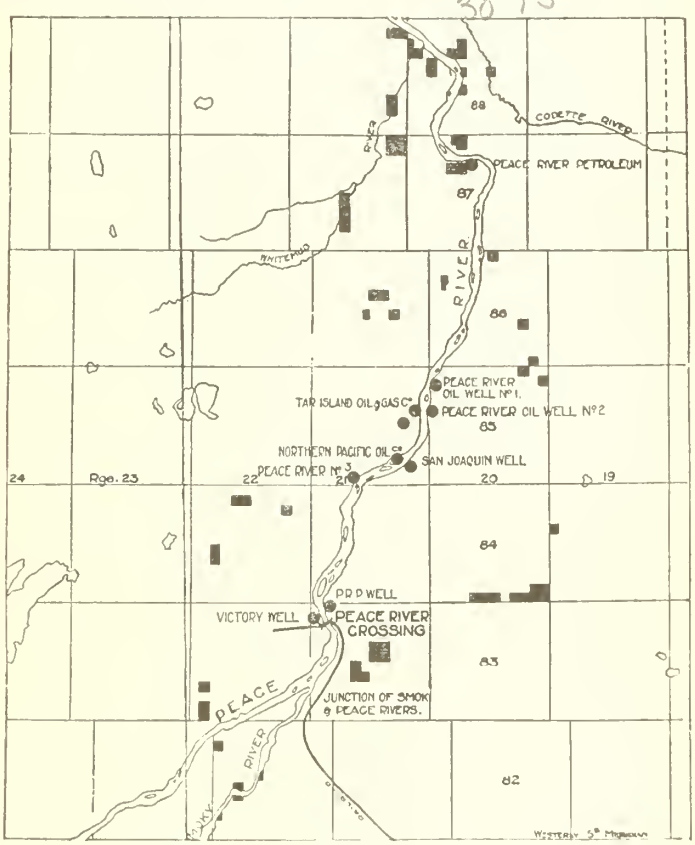
"Extending over many thousands of square miles, we have 1,000 ft. or more of richly bituminous beds And overlying these rocks there are 2,000 ft. of shale and sandstones, from which seepages of oil arise Further, this mass of petroliferous deposits is traversed by large anticlinal folds.

"The high parts of the anticlinal hills are not now favourable territory, for there the oil-bearing beds have been denuded away. But on the flanks of the folds and on certain low parts of the crests, and also on the minor structures, the petroliferous beds are more or less intact.

"Thus there are many places where satisfactory structural conditions occur and pools of oil are likely to be found."

Pouce Coupé Outlook.

It is a moot question whether the forms of the announcements concerning the Fort Norman Well were altogether judicious, without having established its flush production. As a consequence, between two and three million acres are held throughout Northwest Territory, Alberta, Saskatchewan—and in the Pouce Coupé country where 3,500,000 acres were ceded by British Columbia to the Dominion Government. While applying the "acid test" to the Fort Norman District, the Imperial company and others keenly alive to the situa-



Location of Drill-holes in the Lower Peace River area, which have yielded Gas in places, but no Oil as yet.

tion as disclosed there have taken up large areas in the Pouce Coupé section. There results are being eagerly sought; because the Edmonton & Dunvegan Railway is handy and can be utilized if production is obtained. In all approximately 800,000 acres are under lease in the Pouce Coupé—mostly it is alleged by the Imperial, Whitehall, Ptorzheimer, and other interests. Two weeks ago the Imperial crew started for there. The rig and camp is ready for this No. 1 Well. Cost of freighting was so high, the company built a road that will be useful to settlers desirous of reaching Grande Prairie 125 miles away. Freight has been $60 per ton. To Fort Norman it is 9½c a lb. There are seepages in the Pouce Coupé which promise well—and No. 1 Well equipment provides for going down as far as may be necessary, sufficient casing being on the ground. This hole is now being put down some distance from the heaviest seepage, but on the same anticline and at a depth of 100 feet there was a small showing of gas and the colour of oil. A local chronicler states that "anywhere in the vicinity holes dug varying from a foot to greater depths will seep full of oil in a short time. A few days ago Mr.

J. H. Sissons LL.B., acting for a Toronto concern took options on a considerable area. A local brokerage concern is busy securing options. If is in the latter township that the U. S. Canadian Oil Co. has announced early operations. A large Detroit firm of bankers has also, in the past week, secured holdings. Capt. Preston of the Ardua Syndicate, is returning from New York where he has been successful in interesting capital in the development of the holdings of the Ardua Co.

If the Pouce Coupé seepages are not disillusioning, explorations ought to be rewarded. Owing to its accessibility, the locality is favored. Further south there is another bright spot—a new location in the Coalspur Forest Reservation, about 125 miles west of Edmonton, where experts declare there is "the finest structure we have seen in the West, thus far." That was sufficient inducement for the Imperial Field forces to move upon the district, and drilling will proceed. Should indications become a remunerative certanty, it is obvious the last word cannot be spoken regarding our Western oil areas. Meanwhile the Pouce Coupé will bear watching. Grande Prairie is optimistic concerning that "bay in the Rockies," and hopes to have other Midwest New Yorkers share this view. Over the border in British Columbia, too, Mr. Dresser did some careful geologizing for the Provincial Government, which may start an official well or two.

Southern Alberta Prospects.

Officials who feared "the wildest kind of stampede" to the Northland were off in their calculations. Acquisition of millions of acres has proceeded without excitement. While the Pouce Coupé, Fort Norman and Great Slave Lake areas have been thoroughly leased — and the Government at Ottawa wisely concluded not to insist upon full rentals — there is an impression that Southern Alberta may derive more immediate benefit from developments in Montana. Taking outfits to the Mackenzie tries out manhood and treasuries. We have rather positive statements the Fort Norman site was chosen for its certainties—which leaves it for further drilling to provide production adequate to justify transportation facilities. Great Slave Lake calls for extensive exploration before it can be condemned. It is 133 years since Mackenzie noted the probabilities of oil and gas up there—and if it takes a few years more to create an oilfield, or a number of oilfields—at least the country can be patient and Ottawa lenient toward those who have the money to make the pace.

At this writing the Imperial Oil people are operating in what may generally be described as the foothill and boundary country, in Southern Alberta. Holes at Twin Butte, Willow Creek, closer in Saskatchewan to the bounday of Montana, and elsewhere, are at depths of from 1,000 to 2,500 feet. The Record Well at Okotoks is down over 4,000 feet. Several "fishing jobs" were being done when I was in the neighborhood, and the Imperial Company were pushing the reconstruction of their Absorption plant, under an arrangement with the Calgary Petroleum Products Company. Two holes at Twin Butte; two at Willow Creek, West of Nanton —and one at the Black Diamond property west of Okotoks, ought to give that section a fixed status, when wells are finished. The sixth hole in this southern area is within a mile of Montana, in Saskatchewan, and is down over 1,000 feet.

Whether in the Cypress or Sweet Grass Hills, around Lake Pakowki, at Etziko Coulee—close to Montana where wells are being brought in—speculative interests are on the qui vive. The Imperial Company propose to utilize what excellent oil there is—it is not much—coming from the Turner Valley, west of Okotoks, thirty-five miles southwest of Calgary. This oil was found in 1914, and signalized the Calgary "boom," during which some 500 companies were organized, but only a few ever got to the drilling stage. Were it not for the efforts of the Imperial and Whitehall companies, even some of the survivors of that Calgary episode would have nothing left of a profitable character but the experience gained. The purity of the light oil and willingness of the Imperial company to co-operate with any and all having something that might be put to profitable account, is what led to the deal with the Calgary Products, Black Diamond and one or two other companies, by which Alberta in any event will have a gasoline production small as it may be.

Lately, it is understood, Producers & Refiners people have entered the Milk River section. The Record Well on Sheep River had not been stopped at 4,400 feet, according to the last information. Further East, near Cardston, the Boston and Alberta Oil Company have areas. Lethbridge hopes the Montana horizons to be proven to extend over the border—and yet it remains to be seen whether there is another of those vagaries which kept great bodies of iron-ores in the ranges of Wisconsin, Michigan and Minnesota without givin Canada more than it has of them—in quality and quantity.

Transactions in lands along the International boundary, on the Canadian side, and recent visits of Americans, reflects the view that Montana may have pointed the way to accomplish something. Louis Hill has blocks of ground in the Blackfeet Reservation in Montana, not far from the boundary: consequently a drilling campaign is contemplated. If oil is located in this Canadian section it is apt to be deep-seated and not every promotion can carry the cost—unless production is greater than it has been from those wells which the Imperial took over.

The Conflicting Regulations.

Apart from the Fort Norman Well, those interested in oil developments think they know where oil is—and certainly know now where it ain't. The "Consin Jack" maxim is: "Where it is; there it is." More might have been achieved—or could have been accomplished during this drilling season, had the Government regulations been fixedly helpful. Heretofore, as Mr. Dowling of the Geological Survey has pointed out, explorations have been "sporadic." Important interests have earnestly undertaken the onerous work of proving fields—and have little to show for it—at present. They are not through, by any manner of means. In the very nature of things, they cannot stop—and write off all they are not sure of. Vice President McQueen has intimated that 1921 results should be completely determinative. It might have been more constructive had the Government refrained from confusing regulations, however, admirable was the purpose to conserve territory for National purposes and to prevent over-speculation. A large acreage throughout was secured under former, and more liberal regulations. Then when the Fort Norman Well came in, it was thought there would be oceans of oil. It was presumed vast areas were the containers of huge reservoirs of oil—and, in that event, Canada and the Empire must reserve a supply against all contingencies. So existing regulations were suspended, more regulations and still others were issued by Orders-in-Council. Sir James Lougheed—and his bureau chiefs oscillated between doubts and devised what they thought would suffice to hasten explorations while insuring to the Government their proportion—and more.

In some instances there was the possibility of virtual confiscation of leasehold titles. This was rectified where locations antedated the stringent regulations. Again revisions were necessitated by the rigours of the northern latitudes and impossibility of doing the impossible in a stated time. Experienced oil-operators wanted statutory provisions instead of having their holdings subjected to periodic impulses. It was too optional for the Government to impose elastic royalties or percentages. Lessees were compelled to raise capital, select four square miles—prove them—and then hand over three of them to the Government—unless they put up the price on themselves. Anything so unworkable, considering the difficulties and uncertainties, alienated those with working capital, and certainly put the quietus upon the catch-penny cult.

The story of developments to date, plain and unvarnished, is neither prejudicial nor personal. Obviously there has been over-estimation and needless hesitancy about trusting those alone who can hasten conclusions, Imperial and Whitehall companies, of all the large corporations, alone are heartily displaying their enterprise.

Even the Whitehall people are "watchfully waiting." There is little demur to the inhibition of alien ownership—and yet the fear that somebody might find something that some one else should have, has been positively deterring, all unmindful of the inexorable fact that very little oil has been secured notwithstanding great expenditure.

That the Ottawa Government now is more responsive, is an admission that the risks to be assumed were out of keeping with the remuneration capital has to have. Where companies have shown a disposition to develop areas, a nominal acreage—tax has been accepted—payment of the remainder being deferred. The effect of this is to leave more initial capital for proving. The uncertainty due to variations, however, recently was remedied by more Amendments-in-Council, by which each applicant may file application for 2,560 acres or four square miles, for which he will be given a permit for four years, during which time he must discover oil, or his lease lapses. He has two of those four years in which to get his rig on the ground. Besides, up to five of those groups of four square miles, or in other words 20 square miles, may be held as far as development is concerned, by grouping them and drilling one well. If this well is completed within four years, and if oil is obtained, a reasonable extension will be granted within which to drill wells on the other groups of four sections contained in the larger group.

Should oil be obtained on any group of four sections, the permittee shall be allowed to choose one square mile out of the four for which he shall obtain a lease for 21 years, permitting him to proceed to develop the property and produce oil therefrom, paying to the Government a royalty of 5 per cent to April 1926, and 10 per cent thereafter. The title to the other three square miles will remain in the Government, which may dispose of them as it sees fit, except that the lessee of the one square mile shall be given opportunity to meet all *bona fide* offers either on a royalty basis or a basis of purchase, as the Government may decide. His offer being equal to the highest offer submitted, each of these sections shall either be leased or sold to him as the case may be.

This is decidedly tolerant, if academic, owing to the possibility of collusion in bidding, or for mischief-making. The change indicates a greater degree of sanity. Nor is it the only new departure. The Regulations again by Order-in-Council dated 11th February 1921, contained stringent cancellation clauses in the event of default of the lessee. The latest Order-in-Council just passed has ameliorated these clauses to a very substantial extent, and generally speaking the lessee is now to have a notice giving sixty days within which he may remedy his default before cancellation.

It would almost seem as though the Government policy is being stabilized. Retroactive features have been obliterated. Mandatory provisions afford safety and security of title. The grouping privilege will be welcomed, for by it the operator can hold twenty square miles with one rig. Such an area in remote sections makes a rational business proposition. If oil is found, on his groups, he will have a quarter of his area at a not un-reasonable royalty. That he will have to meet competition should the Government exact a higher price or royalty on the other sections, so as to obtain from the field what they regard to be the fair share of profit to which the people of Canada are entitled, may not nor work out satisfactorily in practice. It may meet with the approval of the speculative promoter rather than the pioneer. At any rate, Ottawa —better late than never—has relieved the strain, notwithstanding it raised the rental to 50c per acre for the first year, and $1.00 an acre for each year thereafter. Provided drilling equipment is installed within the first year, no rental is to be charged for the second year. If drilling operations are commenced prior to the beginning of the third year, payment of rental will not be required for the third year.

Should these regulations be final—and if they are made statutory—the assistance they contain will allay much of the unrest attributable to vacillations and academic attempts which retard developments.

For Sands Mix-Up.

As a finale in this narrative—the sole design of which is to present the position as it is—confusion worse confounded exists with regard to the much-exploited tar sands. With these, officials are said to be doing a hesitation waltz—which was supposed to be taboo in the very best circles. More deproclamations in June—the notifications that those who have tar-sand areas cannot do this, that and the other thing with them—and that those wo have supposedly natural-oil areas cannot do this, that and the other thing with the tar-sands—has been perplexing. Holders of leases, who thought they had certain rights now are impressed with the vacuity of those rights. No doubt those tar sands—dealt with as a whole—may attract government enterprise—when government railways finances and lignite plants are perfected and economically satisfactory. But concessions were granted within tar-sand territory. Leases were given, abandoned and held—until, as the Washington Congressman who had been interrupted, incoherently remarked: "Where am I at", is a refrain.

Prior to 1911, several parcels of McMurray tar-sands were granted in fee simple to applicants. According to Ex-Governor Bulyea, there was 4,000 acres so held. Others contend that 12,000 acres were granted. On August 16, 1911, "Tar Sand" Regulations were issued, permitting the tar-sands to be worked and "carried away", at the pleasure of the lessee. The tenure under those regulations was for twenty-one years, with option of extension for twenty-one years—and no royalty was to be imposed until 1931.

Now, at all times, the ordinary Petroleum and Nat-

ural Gas Regulations of 1914—and those Petroleum and Gas Regulations which preceded 1914 — were applicable to the Fort McMurray areas. So applicants began to apply for the tar-sands under these Regulations, the assumption being that the Petroleum and Natural Gas Regulations conveyed the right to oil from the tar-sands. Moreover, the leases granted unto these areas read in part as follows:

"His Majesty doth grant and demise unto the lessee for sole and only purpose of mining and operating for petroleum and natural gas . . . .".

Within the lease as granted, reference was also made (clauses 4, 7, 8 and 9) to the manner in which "mining operations" should be carried on, and for the protection of "mine excavations, mine debris", etc.

In Mareh, 1920, all remaining areas in the McMurray District known to contain tar-sands, were withdrawn from disposal. On Mareh 21, 1921, an Order-in-Council was passed providing that all "oil shales" and all "oil from the oil-shales" should not belong to holders of petroleum and natural-gas leases—but only oil obtained "in a free state by boring".

More recently, in June, other tar-sands sections were withdrawn—those who retain leases cannot touch the sands—and there is "nobody home" in the whole matter. I quote the Ottawa letter which an Edmonton journal in opposition to the government prints as "Ottawa's Latest Oil Joke", and which it avers, "Stands In a Class By Itself, Effeetually Hinders Work:

"Ottawa, June 8th, 1921—I beg to refer you to Petroleum and Natural Gas lease number..... acquired by you, and comprising..... The regulations under which this lease was issued while conveying the right to the oil and gas only, contemplate the recovery of sueh oil and gas by the ordinary process of boring, and do not authorize the extraction of the oil from the tar sands, which may be upon the location, by any other process of recovery. I am directed to inform you, therefore, that while the lease gives to the lessee the right to recover the oil and gas from the location by the method provided in the regulations, namely by drilling or boring. This lease does not anthorize the extraction of oil from tar-sands which may be npon the location by any other process."

This makes uncomfortable those who have tar-sands and no "free oil." It is a ease of

"Mother, may I go in to swim?"

"Yes, my charming daughter.

"Hang your clothes on a hickory limb—

"But don't go near the water!"

Nothing written about the whole sitnation is designedly prejudicial. At Fort Norman and thereabouts; in the Ponce Coupé country; in the Coalspur Reservation around Okotoks and throughout the Southern Alberta areas, the intention is to find oil. It is fully realized that more than the ordinary oil risk is presented. That risk, however great, has been assumed—in largest part by Canada's leading oil corporation—and whatever be the disappointments to date, they are not irredeemable—if the fullest co-operation is maintained. Samples of oil will not suffice. Seepages are inconclusive—if suggestive. Owing to disconcerting regulations this season's results may not be comprehensively encouraging—but we have the statement of vice-president MeQueen of the Imperial Oil Company, that this year will go a long way toward settling many of the points at issue.

Northern Ontario Letter

THE SILVER MINES.

Dividends paid by the mines of the Cobalt district during the first half of 1921 amounted to $1,030,000. The Nipissing was the leader among the silver-mining companies, this concern disbursing $780,000 in the half year. The Kerr Lake came second with $150,000 while the Coniagas paid $100,000.

The silver mines of Cobalt have now paid a grand total of $83,531,066 from the date of discovery in 1903 to June 30, 1921. In addition to this, closed corporations have paid upwards of $4,000,000.

The Nipissing mine has been the largest dividend payer, this company disbursing $23,863,297. The Coniagas holds second place, with a distribution to date of $10,940,000. The Kerr Lake is third with $8,935,000, with La Rose having paid $6,300,546 and the Crown reserve occupying fifth place with $6,190,849. The McKinley-Darragh holds sixth place with $5,955,391, while the Mining Corporation is next in line with $5,530,768.

In paying over a million dollars in dividends during the first half of 1921, the silver mines of Cobalt stood in a class by themselves among silver mines. It is well known that the decline in the price of silver absorbed the greater part of profit which might have otherwise accrued to the silver miners, and, in the case of the majority of the world's silver mines, it has been largely a question of making ends meet.

Conditions, as stated last week in the "Journal," have undergone a marked improvement recently, and the cost of material as well as all economie factors assume aspects which give rise to the belief that industry in Cobalt will soon steady down to almost normal. Wages are still high, but with the cost of living offieially declared to be 40 p.c. below June, 1920, there is promise of further adjustment in the wage schedules. The supply of labor is abundant.

Chas. A. Richardson, manager of the Chambers-Ferland mine, owned by the Aladdin-Cobalt which is now a part of the Kirkland Lake Proprietary (1919) Limited, sailed from Quebec during the past week on his way to London where he will be engaged for about six weeks on company business.

A continuation of the present trend of commodity prices, all of which indicates greatly reduced operating costs at the mines, would soon enable a number of silver mines in the Cobalt field to re-open. Among these are the Beaver Consolidated, Temiskaming and McKinley-Darragh. This is also true of the Kerr Lake where some work is being done, but where production is only being maintained at a minimum rate at present. These four mines could now produce silver at an average cost of perhaps a little under 70 cents an ounce. As against this, the price of silver continues to hover around 60 cents an ounce plus the exchange on New York funds, making a total return of around 66 or 67 cents an ounce to Canadian silver producers. It may be gathered from these facts that either a strengthening in the quotations for silver, or a continued decline in the cost of producing the metal is bound to result in these four mines resuming work in due course. Such a development would stabilize industry in Cobalt, the following mines being even now under operation at normal capacity: Nipissing, Mining Corporation, Coniagas, O'Brien, Chambers-Ferland, Bailey Silver Mines, while the La Rose and the Kerr Lake are producing from certain parts of their properties.

Elk Lake and Gowganda.

The Ontario Government is extending reasonable help to the Gowganda district by continuing the work of improving the road from the railhead at Elk Lake. Those interested in the district are anxious to have this road work continued for the reason that the proposed ligh railway is not a certainty. It is noted that a motor road from Swastika to Kirkland Lake is giving good satisfaction and that although the Gowganda road is about five times as long as that running to Kirkland Lake, yet it should meet the requirements of the field in a reasonably satisfactory manner.

As regards the proposed light railway itself, the promoters of the enterprise are understood to have engaged bond salesmen, and are now endeavouring to sell the bonds privately. It will be recalled that the announcement was reeently made in the "Journal" that the Ontario Government had decided to not lend financial help to the scheme by purchasing a part of the bonds. The scheme of the promoters was to sell the Ontario Government $350,000 worth of bonds, this being at the rate of $3,500 a mile. In addition to this, the promoters secured authority to sell $1,500,000 in bonds privately, this being $15,000 per mile. This would mean a total of $18,000 per mile (less commissions) with which to build the proposed light, narrow-gauge railway. However, the government having refused to take up the $350,000 purchase as requested, leaves the promoters in a position where they were endeavouring to sell the $1,500,000 issue and to make this cover the entire cost. As to the prospects of success, there is a tendency at this time in the mining districts to hazard even a guess.

Exploration work is being done on the Hartley-Wescott iron property, lying some 14 miles north-west from Elk Lake. The owners are reticent as to the result of the work, this attitude having been adopted following unfavorable comment by a section of the press which became confused as to the location of the property, and had no information in regard to the real discovery.

An exceedingly high-grade discovery of asbestos has been made in the Mt. Sinclair district, lying about half way between Elk Lake and Porcupine. The ore is the richest of the kind so far discovered in this field. Together with other asbestos deposits in this district, it is believed to be important.

THE GOLD MINES.

The Porcupine District.

Dividends paid by gold mining companies operating in the Porcupine district amounted to $2,175,361 during the first half of 1921, thereby being more than double the profits distributed by the silver mining companies. The total dividends paid since discovery in 1909 up to June 30, 1921, amounts to $20,282,017 from the Porcupine mines.

During the first half of 1921, the Kirkland Lake field accounted for $40,000 in dividends, this bringing the total up to $718,625 from this field to date. It is noted, however, that a number of other mines were realizing profits and, in the case of Wright-Hargreaves in particular, the dividends from the Kirkland Lake area will shortly be increased.

Another important discovery has been made at the 1,350-ft. level of the McIntyre-Porcupine mine where another ore-body has been opened up. This is believed to be the continuation of one of the important ore-bodies which runs in a north-easterly direction from the Acme side of the adjoining Hollinger Consolidated. In regard to the proposed increase in milling facilities at the McIntyre, the ball mill is already on the ground, but nothing has been done toward installing it.

The Porcupine V. N. T. is still awaiting the outcome of the effect to raise money with which to resume operations. It is understood that certain New York interests are anxious to proceed with this financing and it is thought suitable arrangements may be made. The details have not been announced officially, but a general outline may be available within the next week or so.

The Northerown Mines are lying in total idleness, and very little information is available as to the prospects of adjusting the affairs in such a manner as to assure continuous operation. This is understood to be due to the Thompson-Krist faction being unable to meet its financial responsibilities.

A working station is being cut at the 300-ft. level of the Beaumont Gold Mines, formerly known as the North Davidson. A considerable amount of lateral work is planned for this horizon. Values are said to be encouraging.

Work on the Paymaster property in the township of Deloro is being attended with encouraging results. Work is being carried on largely at the 200-ft. level.

It is unoffieially stated that the ten tons of ore shipped from the Triplex property contained upward of $300 a ton in gold. Work has not advanced far enough to determine whether this ore occurs in a pocket, or not. The Triplex lies in the township of Shaw, and was formerly known as the Tommy Burns.

The Porcupine Peninsula Mines is the name of a new company which has been incorporated for the purpose of taking over property on the shore of Night Hawk Lake. A shaft is down 85 feet, at which point some lateral work was formerly done. It is planned to carry this shaft to a depth of 400 feet provided the required finances can be obtained.

An extremely spectacular discovery of gold has been made on a property lying about 2½ miles east of Bourke's Siding. The find is on a patented property of 160 acres owned by A. O. Anderson. Pieces of gold as big around as a twentyfive cent piece occur in the vein in leaves. The mineralized body is about eight feet in width, with a number of stringers occurring at intervals, these stringers being from two to three inches in width. The gold occurs in one of these stringers in a somewhat similar manner as the silver occurs in the high-grade ore at Cobalt. The discovery is being examined this week by an engineer representing a leading Cobalt company.

The Kirkland Lake Field.

Activity in the Kirkland Lake District is steadily increasing. The latest property upon which arrangements have been completed to carry on extensive mining operations is the Sylvanite. This property lies directly between the Tough-Oakes and the Wright-Hargreaves and is regarded as a mine of importance. The ore bodies which occur on the east and the west of the Sylvanite will probably extend across the property as the main break along which the ore occurs in this district cuts right through the Sylvanite. It had formerly been believed that the Sylvanite would be included in the merger with the Tough-Oakes and would thus be controlled by the Kirkland Lake Proprietary, 1919, Limited. This has not been the case. It is now learned that parties in England who are heavily interested have joined hands with interests in Buffalo and the required money to carry on operations has been

assured. The work will be directed by Albert Wende, manager of the Wright-Hargreaves mine.

A new vein has been opened up at outcrop on the property of the King-Kirkland Gold Mines. The vein is about seven feet in width, and is well defined. A feature is the fact that it runs under a small lake on the property at such an angle as to lead to the belief that it may prove to be the main break from which all the other veins on the King-Kirkland radiate. Further work is being done in opening up the new discovery.

The drift at the 300-ft. level of the Bidgood has been in ore for more than 100 feet, and this property offers promise of developing into a real mine. Work will be centered largely at the 300-ft. level for some months, after which the shaft will probably be continued to a depth of 500 feet. The plant now operating on the property is adequate to carry operations to that depth.

Favorable information is coming from all parts of the Kirkland Lake district, and further substantial growth appears to be assured.

C. A. Foster, at one time identified with the Foster-Cobalt mine, the West Dome and the Tough-Oakes, is understood to have become interested in an option for the Berry group of claims which lie to the east of the Ontario-Kirkland and south of the Burnside Mines.

Arrangements are being made to let an extensive diamond-drilling contract on the Miller Independence Mines at Boston Greek. It is planned to get this work under way early in August. The plan is to carry on drilling from the 500-ft. level, as well as a limited amount from surface.

TORONTO MINING QUOTATIONS.

Quotations on Active Stock on Standard Stock Exchange on July 26, 1921.

	Ask	Bid
Silver.		
Adanac Silver Mines, Ltd.		1¼
Beaver Consolidated		25¼
Coniagas	1.70	
La Rose	18	16
McKin. Dar.-Savage	18	12
Mining Corp. of Can.	1.15	1.05
Temiskaming		21
Trethewey	16	14½
Gold.		
Atlas	21½	20¾
Dome Lake	5¾	5¼
Dome Mines	19.75	19.50
Hunton Kirkland G. M.		6
Keora	13	12½
Kirkland Lake		33¼
Lake Shore M., Ltd.	1.20	1.18
Newray Mines, Ltd.	5¾	4⅝
Porcupine Crown	14	13½
Porcupine V. N. T.	20	17½
Preston East Dome	3	2
Schumacher	22	21
Teck-Hughes	12	10½
Thompson Krist		4¼
West Dome	6½	6¼
Oils.		
Petrol Oil	24	22
Rockwood Oil, Gas		1¼
Vacuum G.	5½	5

TORONTO COAL PRICES.

Toronto, 27th July.

The price of slack coal has advanced, and is now anywhere from $1.65 to $2.00 a ton. It is strong and firm at that price and seems likely to advance further still. The demand for coal is unbalanced, that is to say, there is not enough demand for lump coal to ensure the production of sufficient slack to cope with the demand for the latter. Despite the rising market, however, there is no great increase, at present, in the demand for slack, because the public have not yet realized that it is advancing. But when they do, they will come into the market. Opinion seems to be that there will be no more cheap slack this year.

The anthracite situation is getting worse from the retailers' point of view. The number of retailers who are refusing shipments, because they cannot sell the stocks they have on hand, is increasing every day. There seems to be a slight weakening in the prices charged by the "independent" companies.

METAL QUOTATIONS.

Following are the fair average prices for ingot metals (in less than car-loads).

	Cents per lb. July 20th	July 27th
Montreal.		
Copper, electric	17¾	17½
Copper, casting	17¼	17
Tin	34½	34
Lead	6½	6½
Zinc	7	7
Aluminum	30	29
Antimony	7¼	7¼
Toronto.		
Copper, Electric	16¾	17¼
Copper, casting	16¾	16¾
Tin	37	37
Lead	7	7
Zinc	7	7
Aluminum	28	28
Antimony	9	9

LEBEL TOWNSHIP GOLD.

According to the "Northern Miner" ten properties in Lebel township are being worked. At the Bidgood mine drifting in one at the 300 ft. level is proceeding. At the King-Kirkland a drift is being run at 100 ft. level and the company has been successful in making new discoveries by surface work. At the Wood-Kirkland a shaft has been sunk 100 ft and the vein cut at the 50 ft. and 100 ft. levels. On the Queen-Lebel claims camps are being erected. At the Lebel-Ore good values were found. At the Moffat-Hall an important discovery was made a few weeks ago and exploration is being carried on.

SHININGTREE.

Mining engineers recently returned to Toronto from Shiningtree report that the work of finishing the last section of the waggon road is proceeding at a good pace. At the White Rock mine shaft sinking is under way. Reports that new machinery is being hauled in to the Wasapika mine are denied by the president of the company.

British Columbia Letter

Anchorage, Alaska.

There has been a stampede to a reported strike of rich gold quartz in a district 39 miles south of Anchorage.

Stewart, B.C.

The management of the Premier Mine, Salmon River, Portland Canal District, is reported to have its cyanide mill in operation. Gold-silver bullion probably will be shipped to the Selby Smelter at San Francisco, Cal. for refining. Low-grade ore will be shipped over the new aerial tramway, which this is completed, to the Anyox smelter of the Granby Consolidated Mining & Smelting Co.

On the Silver Leaf Claim, of the Patricia Group, Marmot River, a tunnel, now in 20 feet, has opened up a showing of four feet of ore, assays of which are reported to run $22 in all value, $12 of which is in gold.

Camps are being established on the M. C. Group, situated on the east side of Bear River, preparatory to the prosecution of development work. The property carries promising gold and silver values.

Anyox, B.C.

An important ore body is reported to have been uncovered by Wm. Hanna on his mineral claims near the Hidden Creek Mine of the Granby Consolidated Mining & Smelting Co.

Gratifying results are said to have been achieved by the Granby Company in reducing the smelter charges in connection with the treatment of the Hidden Creek Mines ores.

Alice Arm, B.C.

The announcement that the provincial government intended discontinuing work on the Illiance River trail caused much disappointment which since has been removed by the statement that the project is to be carried through. The road to the Kitsault Glacier, near which the Homestake Mine is situated, is to be constructed to that point by the Homestake Company in order to permit the shipment of machinery to the property.

With the resumption of operations, though on a somewhat reduced scale, at the Dolly Varden Mine the spirit of pessimism, rather in evidence lately in the Alice Arm Camp, has given place to a feeling of renewed confidence. The railroad is being re-opened and trains will make regular runs over the eighteen miles of track between tidewater and the mine. The Northern (B.C.) Press contains the following, no doubt authorized statement, in this connection:

"This season's operations at the Dolly Varden will be along different lines to past years. More attention will be paid to development work and not so much to shipping. In the past the efforts of the Company have been more towards heavy shipping at the expense of proper development. This policy will be changed in the future, but shipping will not cease although it will not be on such a large scale as previously. Just enough ore will be shipped to the smelters to cover the payroll for the development. Major C. B. North, who has been on the ground for some time, will remain in charge."

Nelson, B. C.

The Nelson Branch of the B. C. Prospectors' Association has asked the Dominion Government to arrange for the advance to shippers to the Trail Smelter of a certain proportion of the value of ore so shipped. With money available as soon as shipments are certified to it would be possible, it is argued, to continue without interruption the development of properties which, at present, can only be worked intermittently.

E. W. Widdowson, a provincial assayer and mining man, reports that thirteen sacks of high-grade ore from the new discovery at Elbow Lake in the Pas country, northern Manitoba are expected for treatment. A sample pound, he says, was received a short time ago with a gold content of $20,000 to the ton. Many of the samples received contain hundreds of dollars to the ton and not a few have little or no value, as is the case with samples from a new field. There has been more activity in the Kootenays, Mr. Widdowson reports. A carload each has been shipped to the Trail smelter by the Bell and Beaverdell Mines, which ore is expected to run about 200 ounces of silver to the ton. Operations on the Queen Mine have been resumed after a suspension of six years and the Le Roi No. 2, Rossland, again is working.

Judgment has been handed down in Insinger vs Cunningham, in which the plaintiff is a banker of Spokane Wn. and the defendant a mining operator of Slocan District, B.C. The dispute arose over the alleged non-fulfilment by Cunningham of certain contractural obligations entered into by him when he took over, under option, the Hewitt Mine at Silverton, B.C. Robert Insinger is successful in recovering a sum equal to the value of the development work which Mr. Cunningham apparently agreed to do, but did not complete, while he was working on the property in 1918 and 1919. On all other counts, however, the defendant succeeds. He is not required to make an option payment that Mr. Insinger claimed was due nor is Mr. Insinger allowed damages on account of being prevented from operating the property. On the latter point the judgment says: "As plaintiff (Mr. Insinger) took no steps to enforce his claims for possession, and as, I think, he must be taken to have known that defendant was continuing to operate the mine, and as plaintiff continued to accept payment of royalties or ore mined, I do not think he has any right of action against defendant for retaining possession. Plaintiff is entitled to an accounting of ore mined, as was conceded at the trial."

Trail, B. C.

Receipts at the Trail Smelter, Canadian Consolidated Mining & Smelting Co., for the week ending July 7 were 6,969 tons of ore and concentrates. Of this 6,912 tons came from the company's mines and the contribution of 57 tons by the Surprise Mine, of the Republic Camp, completed the total. The independent shippers to Trail thus far this year follow: Nelson-Arrow Lakes, Gold Hill and Millie Mack; Boundary-Similkameen, Bell, Horn Silver, Providence, Sally, and Sutherland and Thompson; Slocan-Ainsworth-Lardeau, Black Prince, Blue Bell, Florence, Gem, Krao, Nettie L., Last Chance, L.T., Nip and Tuck, No. 1, Ainsworth, and Ruth; East Kootenay, North Star and Paradise; Washington State, Chatterboy, Knob Hill, San Poil, and Surprise. The Blue Bell, of Riondel, with 1,111 tons is the biggest of these shippers. The Knob Hill and Surprise have shipped 395 and 236 tons respectively and the Horn Silver, of Chopaka, Similkameen, has contributed 260 tons. The others have lesser amounts to their credit.

Revelstoke, B. C.

That asbestos exists in the serpentine rocks near Arrowhead has been known for a number of years, reports A. G. Langley, resident government engineer. Nothing was done to exploit it until recently when

some surface stripping and opencut work was done. He observes, however, that development has not advanced sufficiently to determine its economic possibilities.

Cranbrook, B.C.

The Columbia Section of the American Institute of Mining and Metallurgy has been invited to visit the East Kootenay District of British Columbia and to visit some of the mining properties and prospects of the country. A similar invitation has been extended members of the western branch of the Canadian Institute of Mining & Metallurgy. The arrangements for the proposed gathering and field excursions are in the hands of the East Kootenay Branch of the Prospectors' Assn., headquarters, Cranbrook. The rendezvous will be Cranbrook and the time, the week beginning August 21st next. While the programme has not been definitely prepared it certainly will include a visit to the Sullivan Mine, Canadian Consolidated Mining & Smelting Co., the largest operating property of western Canada.

Vancouver B.C.

The threatened dissolution of the British Columbia Chamber of Mines, Vancouver B.C. has been avoided. A substantial grant has been promised by the government and the members have responded to an appeal to advance the additional funds necessary to permit the continuance of the work of the organization.

Glenville A. Collins, who is supervising the development of the Drum Lummon Mine, Hartley Bay, leaves shortly for the property.

A fairly good general grasp of mining conditions throughout British Columbia during 1920 may be obtained by a glance through the reports of the mining engineers in charge of the six mineral survey districts into which the province has been divided.

George Clothier, of No. 1, North-Western District, points out that his terriory may be divided into three belts or zones—"The Coast Range granites, the Western Contact Belt, and the Eastern Contact Belt—the last mentioned has had the greatest amount of prospecting and development this year (1920), though the increase in the number of prospectors throughout the district has been very evident. With the exception of in and around the two centres of activity, Stewart and Alice Arm, there is room for hundreds of prospectors. When the comparatively small areas at the head of Portland Canal and of Observatory Inlet are compared with the remaining absolutely unexplored portion of the Belt, from the head of Salmon river north to Atlin, a distance of 250 miles, some idea of the enormity of the mineralized country and its wonderful probabilities can be gained. The discovery and development of a few more properties such as the Granby mine at Anyox, the Dolly Varden at Alice Arm, the Premier at Stewart, and the Engineer in Atlin would make it the greatest mineral producing Belt in the Province. While there is a great deal of it that is inaccessible, very appreciable portions can be opened up from the Unuk River, the Stikine and Iskut rivers and the Taku river, which empties into Taku arm just below Juneau." He adds that the Coast granites and the Western Contact Belt should not be overlooked, that they are particularly favorable for the occurrence of economic minerals.

The mining industry made satisfactory progress in the northeastern during the first half of the year, according to John D. Galloway, mining engineer, but later "a gradual decline set in." The change he attributes to financial depression and lowered market prices. Production, however, was slightly greater than in the previous year. The Silver Standard, the principal shipper, doubled its output. Practically no copper was mined in the district but "when an improvement in the copper market takes place some of the copper properties on Rocher Deboule mountain and in other parts should again make a production." The placer-gold production, coming chiefly from the Cariboo and Quesnel Divisions, was about the same. Mr. Galloway is of the opinion that the Placer Act amendments will be beneficial and "the impending era of lower prices, which automatically effects a higher relative price for gold, will undoubtedly stimulate the search for yellow metal."

A. G. Langley, engineer in the eastern district of the Province, reports that the industry suffered through lack of labor and that the difficulty was accentuated by strikes called by the O.B.U. He goes on: "The outstanding feature governing this year's production of Lead and Zinc has been the continuous operation of the great Sullivan Mine by the Consolidated Mining & Smelting Co. Under adverse conditions this mine has greatly exceeded last year's output and has been able to supply the smelter with a steady stream of ore thus offsetting the decrease in tonnage from other sources." The season, he says, was an exceedingly busy one in the hills for the small operator, leaser and prospector. To my knowledge many results obtained among the prospects have been very encouraging and it is fully anticipated that next season will see a number of new names on the shipping list, providing market conditions are favorable."

The situation in regard to the Canada Copper Corporation is touched upon by Philip E. Freeland, of the southern mineral survey district. "It seemed probable" he says "that the output from the Canada Copper Corporation's mines on Copper mountain, near Princeton, would offset the loss of the Phoenix tonnage (the Granby Mines at Phoenix were closed down and the plant there dismantled) but, owing to unforeseen difficulties, operations did not commence until late in the Autumn and about the same time the price of copper dropped to 13.5 cents a pound, making impossible profitable mining for the company in its early stages. The mine was closed down pending a rise in copper prices or a decreased cost in supplies and wages. Satisfactory results were obtained in the mine, the ore breaking easily and in comparatively small pieces. It was found that the 42—by 36-inch Farrel-Bacon jaw-crusher in the primary crushing plant had very little work to do, whilst the No. 6 McCully gyratory crushers were overworked. In the mill the rolls did not crush the small siliceous pieces of rock satisfactorily and it seems probable that some type of crusher giving a hard blow will have to be used."

Dealing with the Western District Wm. M. Brewer, mining engineer, tells of the grub-staking by the government of twenty-five parties, of two returned men in each, and describes the manner in which he supervised the work of those who were assigned to his territory. His comment is that "the results, so far as locating mineral claims are concerned may be considered as being only fairly satisfactory, although the results, from the standpoint of valuable information brought back relative to the fields in which prospecting was done, are considered as being quite sufficient to justify the policy pursued by the Government." He

asserts that nothing outstanding has occurred during the year but "very considerable progress has been made in development work, especially on mineral claims on Vancouver Island, where a total amount approximating $500,000 has been spent with satisfactory results." It is to be regretted, it is stated, that the Britannia Mining & Smelting Co. was obliged to discontinue production temporarily because of the fall in copper prices but "it is gratifying to record that the Tidewater Copper Co. Ltd., operating on Sidney Inlet, west coast of Vancouver Island, made the first shipment of concentrates in December, 1920, from the Indian Chief copper mine since the completion of the construction of the concentrating mill and the replacement of steam by electric power."

Nothing is added by R. W. Thomson, of the Central District, to his preliminary report for the reason that he was seriously ill for some months.

THE COAL MINES.

The coal production for the Province of British Columbia for the month of June follows:

Vancouver Island Field.

	Tons.
Canadian Western Fuel Co., Nanaimo	36,221
Canadian Collieries (D) Ltd., Comox	34,993
" South Wellington	6,945
" Extension	16,003
Nanoose-Wellington, Lantzville	1,786
Granby Consolidated Ming., Smltg. Co., Cassidy	23,015
Old Wellington Coal Co.	230
	119,193

Nicola-Princeton Field.

Middlesboro Collieries, Merritt	6,770
Fleming Coal Co., Merritt	3,187
Coalmont Coal Co., Coalmont	
	9,957

Crow's Nest Pass Field.

Crow's Nest Pass Coal Co., Coal Creek	31,989
Crow's Nest Pass Coal Co., Michel	17,298
Corbin Coal & Coke Co.	4,390
	53,677

Grand Total for Month . . 182,827.

The total for the month of May was 192,061, so that there has been a decline in the output in comparison with the previous month of 9,234 tons. The Crow's Nest Pass Coal Co., both at Coal Creek and at Michel, has slightly increased its production while at Corbin there has been a decrease. On Vancouver Island there has been a drop in the production of every colliery. In the Nicola-Princeton section there is little difference except in the case of the Coalmont Coal Co. which has not been producing, having been engaged in completing the installation of plant. Coal now is being taken out on this property, however, and the mine may be expected to figure as a shipper during the present month.

POSSIBLE APPLICATION OF THE "MYSTERY GUN" TO MINING.

A correspondent of the "Manchester Guardian" couples the name of Sir Edgar Jones, M.P., with the noiseless gun, said to have been invented by an Englishman who was a member of the British Inventions Board during the war. In reply to the questioning of the correspondent, Sir Edgar stated:

"I have seen it and took a lot of interest in it when I was in New York. But I am not interested in it as a gun, but in its application to industry, particularly to coal-mining and quarrying. It is a very small instrument, that will make blasting with powder unnecessary. These developments are proceeding, and one of these days I think we shall have a very considerable and remarkable development.

"It is true that as a gun it will revolutionize gunnery, because it has no recoil and makes no noise. The inventor is not keen at all in applying his discoveries to destruction but in making them applicable to production. And it is from that point of view I am interested.

"Who is the inventor? He lives just outside London, and is working away to apply the invention to industrial purposes. But as a gun, I think our own people were getting ready to use it before the war ended. The inventor is a very clever man. He was a member of the Inventions Board, and has several important inventions all over the world. The arrangements for the trials of which the cables speak now were made when I was in New York.

"What of its applicability to mining?"

"Well, here is the instrument" (measuring a space of about a foot). "The man with it goes up against the face of coal. He works the instrument, and 'biff,' splits the whole face of the coal. Then all he has to do is to get the coal out. It is not a blasting operation. It is just the delivery of a blow at a terrific velocity on a small patch which cracks the whole piece. It will crack granite or slate or any hard rock. It is very small but very complicated and very effective. There is no contact with the air, and therefore no sound and no recoil. It is based on new mechanical principles absolutely."

OIL PROSPECTING.

The "oil fever" has spread to British Columbia. There have been a number of parties leave this Province for the Fort Norman, Northwest Territories, during the past few months. For the most part they have been composed of former Yukoners, men accustomed to the northern trails, who have treked from Dawson over the snows to the scene of the late notable Canadian strike. Those who made this trip, for the most part have been in, staked their land and are out again. One such expedition staked 10,000 acres of land in three sections, one close to Fort Norman and the others close to the river but further away. Meanwhile the rush from Alberta over the now open waters continues. In the Province of British Columbia the government continues the prospecting of the Peace River Block and the Imperial Oil Company is at work in the Pouce Coupé Country. From Rolla, B. C. comes the reports that "a fairly strong flow of gas with a slight mixture of oil has been encountered by drillers for the Imperial Oil Limited at the company's well, twelve miles northwest of here, after less than a week of operation. The well is situated practically in the bed of Pouce Coupé River, 650 feet below the prairie level. The formation is sandstone. The drillers are continuing with their heavy rig on a twenty-inch hole, making now about fifty feet to the shift. The well is just on the Alberta side of the inter-provincial boundary." In the region of the lower Fraser River drilling still is in progress at various points and from Quatsino Sound, northern Vancouver Island, comes the news of the finding of oil shale.

COAL OUTPUTS, B. E. STEEL CORPORATION, FIRST HALF 1921.

The coal production of the constituent companies of the British Empire Steel Corporation for the first half of 1921 compares with the two previous years as follows:

	(Long Tons)		
	1919	1920	1921
Dominion Coal Co.	1,727,018	1,825,439	1,634,903
Nova Scotia Coal ..	243,576	315,329	280,824
Acadia Coal	190,558	249,463	197,960
Total	2,161,152	2,390,231	2,113,687

From present market indications the production of the combined companies for 1921 may reach 4,250,000 tons, which will compare with 4,839,402 tons in 1920 and 4,439,360 tons in 1919. The combined production of the three companies in 1913 was 6,473,581 tons, and the 35 per cent reduction in coal output which recent years have shown from the 1913 figures is chiefly attributable to the drain of the war upon the man power at the collieries, and to the fact that this drain was concentrated upon the producing class of mineworkers.

In neglecting to ensure the continued output of coal and gold from Canadian sources during the war period, and since, the political leaders of Canada were ill-advised.

SUBMARINE COAL EXPERT IN CANADA.

The Chief Mineral Inspector of the Department of Woods and Forests in Britain, Mr. Westgarth Forster Brown, is visiting the mines of the British Empire Steel Corporation in a professional capacity as an advisor on submarine coal mining. The coal lying beyond the foreshore in Britain—with one exception—is the property of the Crown, and its administration and leasing for operation comes under the direction of the Department of Woods and Forests. Mr. Brown will consult with the mining staff of the Corporation as to submarine mining practice in Cape Breton, and will probably visit the ore mines at Wabana. The British Empire Steel Corporation is now operating twelve mines in the Sydney district which are wholly submarine operations, and its existing land mines will, by a course of natural extension eventually become submarine operations also. Additional openings from the shore on submarine territory will also be made in the future. As miners of the submarine iron ore body at Wabana, Newfoundland, in addition to its coal mines under the sea, the British Empire Steel Corporation directs the most extensive undersea mining operations in the world, and its submarine workings are likely to become much more extensive both as to area and as to distance of penetration of the submarine tracts from high-water mark.

The Canadian Miners' Buying Directory.

Acetylene Gas:
Canada Carbide Company, Ltd
Prest-O-Lite Co. of Canada, Ltd.

Acetylene Welding:
The Toronto Iron Works, Ltd.

A.C. Units:
MacGovern & Co
Powley & Townsley, Limited.

Agitators:
The Dorr Co
Can. Chicago Bridge & Iron Co., Ltd.
Horton Steel Works, Limited.

Air Compressors:
Belliss & Morcom, Ltd.
Laurie & Lamb

Air Hoists:
Canadian Ingersoll-Rand Co., Ltd
Mussens, Limited.

Air Receivers:
The Toronto Iron Works, Ltd.

Alloy and Carbon Tool Steel:
International High Speed Steel Co., Rockaway.
Peacock Brothers Limited.

Alternators:
MacGovern & Co.

Aluminium:
Spielman Agencies, Regd.

Amalgamators:
Northern Canada Supply Co.
Mine and Smelter Supply Co
Wabi Iron Works.

Antimony:
Canada Metal Co.

Antimonial Lead:
Pennsylvania Smelting Co

Arrester, Locomotive Spark:
Hendrick Manufacturing Co

Assayers' and Chemists' Supplies:
Dominion Engineering & Inspection Co
Lymans, Limited
Mine & Smelter Supply Co.
Pennsylvania Smelting Co.
Stanley, W. F. & Co., Ltd.

Ash Conveyors:
Canadian Link-Belt Company

Ashes Handling Machinery:
Canadian Mead-Morrison Co., Limited
Canadian Link-Belt Co., Ltd.

Assayers and Chemists:
Milton L. Hersey Co., Ltd.
Campbell & Deyell
Ledoux & Co.
Thos. Heys & Son
C. L Constant Co.

Asbestos:
Everitt & Co

Balls:
Canadian Foundries and Forgings, Ltd
Hull Iron & Steel Foundries, Ltd.
Peacock Brothers Limited.
The Wabi Iron Works.
The Hardinge Conical Mill Co
The William Kennedy & Sons, Ltd.

Ball Mills:
Hardinge Conical Mill Co.
Hull Iron & Steel Foundries, Ltd
Mine and Smelter Supply Co.
The Wabi Iron Works.
The William Kennedy & Sons, Ltd.

Balances—Hensser:
Mine and Smelter Supply Co

Babbit Metals:
Canada Metal Co.
Hoyt Metal Co.

Ball Mill Feeders:
Hardinge Conical Mill Co
Hull Iron & Steel Foundries, Ltd

Ball Mill Linings:
Hardinge Conical Mill Co
The William Kennedy & Sons, Ltd.
Peacock Brothers, Limited
Hull Iron & Steel Foundries, Ltd

Belting—Leather, Rubber and Cotton:
Canadian Link-Belt Co., Ltd.
The Mine & Smelter Supply Co
Northern Canada Supply Co
Jones & Glasco.

Belting:
R. T Gilman & Co
Gutta Percha & Rubber, Ltd

Belting—Silent Chain:
Canadian Link-Belt Co., Ltd.
Hans Renold of Canada, Limited, Montreal
Jones & Glassco (Regd)

Belting (Transmission):
Goodyear Tire & Rubber Co

Belting (Elevator):
Goodyear Tire & Rubber Co

Belting (Conveyor):
Goodyear Tire & Rubber Co
Gutta Percha & Rubber, Ltd

Bins and Hoppers:
The Toronto Iron Works, Ltd.
Can. Chicago Bridge & Iron Co., Ltd.
Horton Steel Works, Limited.

Blasting Batteries and Supplies:
Canadian Ingersoll-Rand Co., Ltd
Mussens, Ltd.
Northern Canada Supply Co.
Canadian Explosives, Ltd.
Giant Powder Co. of Canada, Ltd.
Powley & Townsley, Limited.

Bluestone:
The Consolidated Mining & Smelting Co
The Conlagas Reduction Co., Ltd.

Blowers:
Canadian Fairbanks-Morse Co., Ltd
MacGovern & Co., Inc.
Northern Canada Supply Co.
Fraser & Chalmers of Canada, Ltd.

Boilers:
Northern Canada Supply Co.
Canadian Ingersoll-Rand Co., Ltd
Marsh Engineering Works
MacGovern & Co., Inc.
R. T. Gilman & Co.
Fraser & Chalmers of Canada, Ltd.
The John Inglis Company
Wabi Iron Works.

Blue Vitriol (Conlagas Reg'd):
Canadian Fairbanks-Morse Co., Ltd.

Bortz and Carbons:
Diamond Drill Carbon Co.

Boxes, Cable Junction:
Standard Underground Cable Co. of Canada, Ltd
Northern Electric Co., Ltd.

Brazilian Rough Diamonds:
Diamond Drill Carbon Co.

Brazilian Mica:
Diamond Drill Carbon Co.

Buggies, Mine Car (Steel)
Hendrick Manufacturing Co

Brazilian Ballas:
Diamond Drill Carbon Co.

Brazilian Rock Crystal:
Diamond Drill Carbon Co.

Brazilian Tourmalines:
Diamond Drill Carbon Co.

Brazilian Aquamarines:
Diamond Drill Carbon Co.

Bridges—Man Trolley and Rope Operated—Material Handling:
Canadian Mead-Morrison Co., Limited

Bronze, Manganese, Perforated and Plain:
Hendrick Manufacturing Co.

Buckets:
Canadian Ingersoll-Rand Co., Ltd
Canadian Mead-Morrison Co., Limited
The Electric Steel & Metals Co.
R. T. Gilman & Co.
Hendrick Manufacturing Co.
Canadian Link-Belt Co., Ltd.
Marsh Engineering Works
Mussens, Ltd.
MacKinnon Steel Co., Ltd.
Northern Canada Supply Co.
Fraser & Chalmers of Canada, Ltd
The Wabi Iron Works

Buckets, Elevator:
Canadian Link-Belt Co., Ltd.
Hendrick Mfg. Co.
Peacock Brothers Limited.

Cable—Aerial and Underground:
Canada Wire & Cable Co.
Northern Canada Supply Co.
Standard Underground Cable Co. of Canada, Ltd
Peacock Brothers, Limited

Cableways:
Canadian Mead-Morrison Co., Limited
Fraser & Chalmers of Canada, Ltd.
Mussens, Ltd.
The Wabi Iron Works
R. T. Gilman & Co.

Cages:
Canadian Ingersoll-Rand Co., Ltd., Montreal, Que
Northern Canada Supply Co.
Fraser & Chalmers of Canada, Ltd
The Electric Steel & Metals Co
The Mine & Smelter Supply Co
Mussens, Ltd.
The Wabi Iron Works

THE DIABASE MASSES AT GOWGANDA.

By R. E. HORE.

Mr. Kirby Thomas who has just returned from a trip to examine mining property at Gowganda calls attention to the nature of the masses of diabase in the silver district. He states that his observations lead him to conclude that geological structure at Gowganda is more like that at Cobalt than is generally supposed. While there are some undoubted dyke like diabase masses, much of the diabase is in the form of a thick sill. Most of the work done has been near the upper edge of the sill. Mr. Thomas argues that more general recognition of the sill form of the diabase should result in more exploratory work along its lower contest.

At Gowganda as at Cobalt the silver deposits are associated with diabase masses and are believed to be genetically connected with them. At Cobalt most of the silver mined has come from sedimentary rock intruded by a diabase sill. The silver deposits are seldom far distant from diabase. Some of the silver is in veins in the diabase itself, but most of it in the rocks immediately below or above the sill or its former extension. Most of the silver at Cobalt was below the diabase sill.

The sill character of the diabase masses at Gowganda was noted by the Bureau of Mines geologist, Mr. A. G. Burrows and sketches showing the supposed relationships of the rocks in the vicinity of Miller Lake are included in his report on the area. He states that the diabase sills, here and there exposed by erosion, are in large volume. They not only intrude the Cobalt series, but in places cut below the contact of this series with the older rock. In the vicinity of Miller Lake an area of Keewatin overclaim by conglomerate, and about two miles in width, lies on the diabase sill.

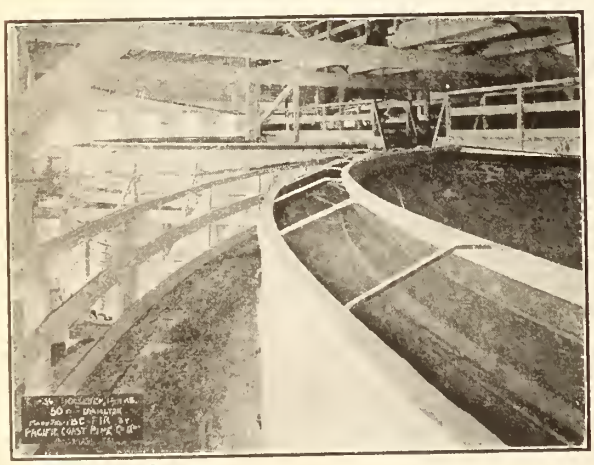
It was remarked by Mr. G. M. Colvocoresses, who was for some time manager of the Millerct mine, that while Dr. W. G. Miller reported that 85 to 90 per cent of the silver production at Cobalt came from the footwall of the diabase sill, yet nothing has been found in the footwalls of the several diabase intrusions which carry silver in the Gowganda district. Mr. Thomas makes the same observation and suggests that possibly more searching investigation of the footwall rocks would be rewarded by discoveries.

ANNOUNCEMENT OF MALCOLMSON CONSOLIDATION.

Announcement is made that the Malcolmson Briquet Engineering Company has consolidated with the St. Louis Briquette Machine Company under the corporate name of the Malcolmson Engineering and Machine Corporation. The Corporation will continue to act as engineers and contractors for the building of complete plants for fuel briquetting, peat harvesting, low temperature distillation of fuels, preparation of phosphate rock, and for the drying, crushing and screening of coal and rock products. It will also maintain an engineering department devoted to the generation and use of steam, special furnace design and other heat problems. In addition, it will manufacture Rutledge, Komarek and improved roll-type briquetting presses, fluxers and other special machinery and machine parts, direct and indirect heat-dryers, and vibrating screens.

NIPISSING COMPANY INTERESTED IN PORCUPINE DISTRICT.

It is reported that the Nipissing Mining Company of Cobalt is examining claims in the Porcupine District with a view to operation. It is stated that the Rochester-Veteran Claim at Porcupine will be drilled by the Nipissing interests with a view to deciding its desirability as a purchase.



EDITORIAL

Northwest Oil Regulations --- Further Criticisms

The Montreal "Star" shows commendable enterprise in sending its special correspondent to Fort Norman. The public is tremendously interested in the oil possibilities of the Northwest, and its imagination has been stirred by the remoteness of the places where drilling for oil is now being carried on; by the use of airplanes, by information regarding the great rivers and forests and the comparative habitability of territories which only a few geologists, the Hudson Bay Company and the Indians knew about; and by the vaguely menacing scramble of the nations of the world for petroleum, made more avid by the proved usefulness of petroleum in war. There are indications that those who are searching for oil may, as has been the case in other countries, of the advance guard of those who shall discover other deposits of economic value, and, whether the Northwest proves to be a producing oil country or not, the general knowledge of conditions in the largely uncharted North appears certain to be enlarged, and the boundaries of settlement will be permanently extended northwards in Canada.

The most recent news sent by the "Star" correspondent confirms our previously expressed belief that the opening of the Northwest for oil staking under the recent Regulations is about to lead to confusion in titles, to wholesale peddling of staked claims, and to retardation of the efficient commercial development of the field. Mr. Chester Bloom writes: "The oil locators aboard the "Northern Trader" (the first steamship to arrive at Fort Norman this year) "learned with astonishment that more than 700 miles of territory have been staked out for oil claims in the vicinity of Fort Norman gusher since last Winter. . . Practically every half-breed in all the northern posts has been busy at this work during the Winter and Spring, and then making over their holdings to syndicates or companies." As is to be expected, the claims have been inaccurately staked, and much overlapping will result. "They are laid out," writes Mr. Bloom, "by all points of the compass, and already there are murmurs of storms to come over prior rights of filing." As soon as a claim is staked, the stakers "beat it" out of the district to get to some recording office "and then return home." This kind of thing is not the way to develop an oilfield, nor to reduce the cost of such oil as may eventually come out of it. Neither will it, in the long run, help the revenues of the Canadian Government, as it must inevitably lead to unskilful operation of oil properties, to creation of fictitious values recorded on paper, to endless litigation and endless legal costs. The traditional method of opening up hard-rock mining areas for staking in this way is no reason why it should have been applied to oil deposits held by the Crown in a remote region. The whole proceeding has been based on false premises, and is fundamentally illogical. No economic, and most certainly, no geological reasoning could have led to the framing of the amended and re-issued North West Oil Regulations. The Government should have been guided by one set of considerations only, namely, how to get the most oil out of the North Country, at the earliest date and over the longest period of yield, at the lowest producing cost and with the greatest possible monetary return to the Government. If these primary conditions had been studied, and the regulations framed to achieve them, it would have been seen that a concentration of capital and effort and not a wilful dissipation, was required, and the present lamentable mix-up, which will bring tragedies and bankruptcy in its train, could have been avoided. The Government has desired to have its cake and eat it too. It will end by achieving neither aim.

CERAMICS IN CANADA.

At a teachers' gathering in Toronto there were recently exhibited specimens of artistic pottery made from clay mined in the vicinity of Bowmanville. This clay is stated to be peculiarly suited for pottery uses in its natural state, and does not shrink on being fired, but undergoes a slight expansion.

In a bulletin on the resources of Saskatchewan issued by the Natural Resources Intelligence Branch there is shown a remarkable range of clay products made from Saskatchewan clays, including glazed and modelled vases, bowls, plaques and specimens of the ceramic art that are of much beauty and excellence.

Mr. A. A. Cole, at a recent meeting of the Cobalt Branch of the C. I. M. & M. spoke of the pottery clay that is found in a remote part of the James Bay slope, from which the finest porcelain can be made.

There are a number of clays in the Maritime Provinces suitable for earthenware, and as those who are familiar with the local potteries of the United Kingdom and Europe are well aware, it is not necessary to have a china clay to make pottery in which craftmanship can be acceptably displayed.

The Prairie Provinces, as may be ascertained from perusal of the literature of the Ceramic Branch of the Mines Department at Ottawa, are rich in suitable clays for ceramic uses.

It is therefore most pleasing to read that teachers' associations are interesting themselves in pottery, even if it be only for the sake of inculcating love of craftmanship and the pleasure of handiwork into their pupils. All great pottery industries have commenced in this way, and the art has always been one in which the individual craftsman could make his mark and found a local industry.

The provincial departments of education, and the federal department of technical education, should encourage the plastic arts, and particularly any attempt made by local artists to utilise clay occurrences that have especial merit as ceramic materials, because by this means not only would much pleasure be given and obtained by those who engage in a fascinating pursuit, but substantial local industries could be established and an avenue of cultural improvement would be opened up that so far has been much neglected in Canada.

There is of course a much wider opening for utilisation of Canadian clays in the manufacture of terra cotta, fireproof building-materials, refractory bricks and the more usual clay products, but these are matters requiring much capital outlay and market demand.

There is a school of Canadian art today, well-established and possessing much genius, as a visit to the art galleries and exhibitions will disclose, but it is largely pictorial and monumental art. Ceramics and plastic arts generally should be given more attention, and if this were done, there is no doubt that Canadian craftsmen could turn out articles that would be more beautiful than some of the imported abominations that are offered for sale.

MINERAL PRODUCTION OF THE UNITED STATES.

The preliminary summary of the mineral production of the United States for 1920 is a unique document, and its appearance at a date which is little past the half year of 1921 is a considerable achievement, because the scope of the compilation includes not only estimates of production, but also statistics of imports and exports and the mineral production of foreign countries.

The estimated value of the minerals produced in the United States during 1920 totals the really stupendous figure of $6,707,000,000, exceeding any previous annual value, and comparing with the previous record value of $5,540,496,000 in the year 1918. Coal, iron-ore, petroleum, copper and clay products stand out by their magnitude, and coal alone accounts for about 35 percent of the total.

Some modern tendencies are discernible from study of the statistics. Aluminium showed a growth both in domestic production and in imports, and the value of sulphur production nearly doubled over 1919. Titanium ore, uranium and vanadium minerals show remarkable increases, in quantity and in value. Production of the precious metals used in currencies amounted to a little over one hundred million dollars in value, a comparatively insignificant amount in comparison with the value of the raw materials of industry.

Of a total apparent consumption of unmanufactured asbestos valued at $10,133,182, the value of imported mineral was $9,120,253, noted as being "mainly from Canada." The recorded figures of asbestos production in other countries, including South Africa, do not indicate that either Canadian or United States miners of asbestos need fear very urgent competition, even if quantity is considered and quality disregarded. The nickel imported into the States during 1920 was valued at $10,857,657, ninety-one percent being of Canadian origin.

The story of the mineral production of the United States is shown by the total value of mineral production by five-year periods over the quarter-century ending 1920, as under:

Five yrs. ending	Value of Mineral Production
1900	$4,138,729,000
1905	6,961,356,000
1910	9,437,174,000
1915	11,101,236,000
1920	25,361,431,000

This is a record without parallel in history, alike as to the rate of growth and the magnitude of the tonnages. While to some extent the spectacular rise of the aggregate value of the mineral production of the United States is due to the decreased purchasing value of paper currencies causing an apparent rise in monetary value, yet the actual performance on a basis of tonnage production has no precedent, and, to an extent that is not determinable, the increased value of mineral products is a real one, inasmuch as it represents enhanced intrinsic value arising from depletion of mineral reserves

If the United States can produce at this rate in a lean year like 1920, what may she not produce when the lassitude of the war fever has been cured, and the whole world bends its energies to production from the soil in agriculture and mining combined?

It is not without interest to Canadian readers, in view of certain changes in the duties of the Division of Mineral Resources at Ottawa to observe in the prefatory note to the Washington Mineral Summary the following remarks: "Many of the figures for both 1919 and 1920 are preliminary, and some are estimates. This incomplete condition of the figures for 1919 is due to the plan of co-operation with the Bureau of Census, by which producers' reports for 1919 to the Geological Survey are received through the Census."

THE NORTHERN LIGHT RAILWAY PROJECT.

We are glad to note that the Toronto "Globe" stresses the desirability of a railway to serve the area included in the project of the Northern Light Railways, and particularly agree with the statement that wagon roads are a costly and unsatisfactory compromise in comparison with rail service. The proposal to extend the T. & N. O. railway to James Bay, and even the more modest proposal which was recently made to extend a short distance north of Cochrane, was, we believe premature and not required by any real economic needs of Northern Ontario, and its abandonment at this time is a wise action. But the district lying between the T. & N. O. and the C. N. railways, in the potentially important and comparatively accessible area between Porcupine and Cobalt offers very definite promise of profitable production, and anything that will increase the output of new gold in Canada at this time is worth the most urgent and serious consideration of governments. Any economy that retards gold production at this date is actually not an economy at all, but the reverse.

MR. R. E. HORE, in this issue stoutly defends the gold miners of Northern Ontario for making the best of the depreciated value of Canadian paper money by disposing of new-mined gold, by way of the Canadian Mint, and receiving for it United States paper money, which, because of the inflation of our own paper issues and the comparative non-inflation of United States paper issues, commands a premium when exchanged into Canadian paper currency. He states "the lowering of the exchange rate is not the business of the gold producer." Possibly not, but there is no one in Canada that is doing more at this time than the gold miner to bring about a condition which the general public desires more than our political leaders and our financiers desire it, namely, restoration of Canadian paper money to parity at New York. The corrective of exchange is a good, though bitter, medicine. The gold-producer in Canada at this time is a person attended by singular felicity, because he profits by the New York premium, and at the same time knows that he is helping Canada's credit. The assistance in correcting exchange in Canada's favour that the Canadian gold producer can give by purchasing Canadian-mined coal and mine materials is not so great as the assistance that he can give by producing gold in continuous and ever-increasing quantity. We are suffering from a shortage of the gold backing to our currency, and, so long as we buy more than we sell in commercial exchanges of materials, the mine is the only place from which we can get new gold. The gold miner should be encouraged by every possible means available to Canadian statesmanship. It may be further remarked that as a user of raw materials, such as coal, the gold-mining industry is not remarkable. When gold-mining is successful, it produces large monetary returns with a comparatively small expenditure of materials and a small number of workers. It is an industry that at this time should be worked insistently and intensively, and it has always been a source for wonder that Canadian statesmen have never realised the possibilities for maintaining our national credit that the country's gold mines have presented during the period since 11th November 1918 and this date.

The Ontario Government has decided not to erect a provincial cement plant. The Minister of Public Works states that the many calls on the finances of the Province have led to the decision. It is a wise one. There are no reasons why a provincial cement plant could operate more cheaply than a privately-owned plant, and there are many reasons to expect the operation to be more costly. The only excuse that a provincial government could legitimately give for erecting a cement plant would be that of inability to obtain cement because of shortage of cement-making plants, and this condition does not exist. Even where there is reason to believe that unreasonable profits are being made by a manufacturer, the duplication, unnecessarily, of manufacturing capacity, is a waste of public monies, and it has not been proved that cement prices are unreasonable.

Applications are asked by the Publishers of the "Canadian Mining Journal" for the position of Editor, which will become vacant shortly through the resignation of Mr. F. W. Gray, who is joining the staff of the British Empire Steel Corporation in Montreal.

DR. STANLEY SMITH GOES TO QUEEN'S.

Dr. Stanley Smith is appointed assistant in the department of mineralogy and geology at Queen's University, Kingston. Dr. Smith is an M.A. of Cambridge, and a D.Sc. of Durham University. Before the war he was lecturer on fossil corals at the British Museum and Wales in Aberstwyth. He served two years during the war, being recalled at the end of 1917 to take over the department of geology at the Welsh University. The announcement is made by the Principal, Dr. Taylor, who has returned to Kingston from an overseas visit.

CORRESPONDENCE.

Winnipeg, 27 July, 1921.

The Editor, Canadian Mining Journal.

Dear Sir,—Mr. J. P. Gordon hits the nail on the head, in your impression of July 22, in urging a return to Crown Grants under Dominion mining regulations. It was a long step backward when the Crown granting regulations was repealed and these infernal leases substituted. (Infernal is a French word as all scholars will recognize). I have written much on this subject, and have done all I could to awaken the mining community to the utter idiocy of the substitution of a lease for a Crown Grant, but there is so little actual mining in Manitoba, as yet, that my appeals fell on deaf ears. To the wild-catter leases and grants look "allee samee."

The Flin Flon people had to protect their claims by taking out placer leases, and Mr. Gordon would have been wise to do as much—but it should not be possible for any one to record placer claims in Ontario, Manitoba, Saskatchewan, or Alberta. There was a certain cold spell occurring as some deeply scientific men tell us, about 20,000 years ago, and which other equally scientific men assure us took place not less than 250,000 years before Winnipeg was founded, which effectually did all the cleaning up any respectable placer could demand. All that was left is a little "Chinaman's gold," a light, floatable, leaflet form, in meagre quantities in some of our river bars. If any poor devil wishes to scrape up this stuff, let him do it without license or fear of the law, but don't let placer leases conflict with legitimate attempts at hard-rock mining.

Yours faithfully,
CHARLES A. BRAMBLE.

DEATH OF A. C. ROSS.

The late A. C. Ross, whose death is reported in Montreal on the 30th July, was intimately connected with the development of coal mining in Cape Breton. His father, Rev. Hugh Ross, in 1867, opened the first workings into undersea coal under Sydney Harbour. In his book on "Minerals and Mining" Hon. Robert Drummond writes: "It is claimed for A. C. Ross, ex-M.P., that to him belongs the honour of having been the first to drive a pick into the seam at Victoria Mines. Though the starting of a colliery to run under the sea was, in those days, a momentous occurrence, there was no formal, no elaborate, ceremonial at the opening, otherwise Mr. Ross would be the possessor, not of a silver trowel, but of that rarer implement, a silver pick."

Mr. Ross was prominent in the negotiations for consolidation of the companies and areas that preceded the incorporation of the Dominion Coal Company in 1893, and was associated with the late B. F. Pearson of Halifax in his nmmerous mining and transportation promotions.

In newspaper circles and politics Mr. Ross was well-known in Nova Scotia, he having owned and published several of the Cape Breton newspapers, and having been member of parliament for a Cape Breton riding in the Liberal interest. He was a leader in the promotion of a large number of mining and transportation companies that are now in operation in Nova Scotia, many of them being now included within the properties of the British Empire Steel Corporation. He was born at Margaree, Cape Breton, in 1847.

Mr. Ross was a true type of the *entrepreneur*, and had a native genius for marshalling information on local natural resources in a manner that attracted and interested capital in their development. His lively interest in such matters continued through a long and active life, and up to the time that his health failed.

COLLOIDAL PITCH THE LATEST FLOTATION REAGENT.

For two or three years metallurgists interested in flotation have heard reports of a mysterious new flotation reagent which was said to be giving remarkable results in an experimental way. A few knew that the discoverer was a Mr. Luckenbach whose headquarters were in Brooklyn, N. Y., and a still smaller number were permitted to visit his laboratory and see demonstrations. The actual composition of the reagent used has been carefully concealed until recently, however, until the publishing of the British patent specifications (Engineering and Mining Journal, June 25, 121).

Mr. Luckenbach has named his discovery "Rex"—meaning "king" of course. It is common pine pitch added to a solution of caustic soda. This is to be sold as a plastic mass, it is understood, which is to be mixed with water at the mill and added to the flotation circuit. The pitch does not go into solution, but forms a colloidal suspension, and is said to have remarkable properties as a frother and collector. It has not yet been used on a commercial scale, but has been thoroughly tested out in the Luckenbach laboratories, and also by some of the Cobalt mining companies and by the Canadian Department of Mines at Ottawa. Comparative tests at Ottawa on 1,200-lb. samples crushed to 80 mesh are said to have given the following results:

	Luckenbach Reagent Per Cent Cu			Callow "XY" Reagent Per Cent Cu		Oil Per
	Test 1	Test 2	Test 3	Test 1	Test 2	Cent Cu
Feed. . . .	1.65	1.55	1.60	1.72	1.49	1.35
Concentrates	10.63	13.95	13.95	6.70	8.50	10.70
Tailings . .	0.19	0.26	0.19	0.20	0.28	0.62
Recovery. .	90.1	89.8	89.9	90.8	84.3	57.6

The ore on which these tests were run was from Anyox, B. C., and the mineral was chiefly chalcopyrite. Excellent results are also claimed on carbonate ores, without sulphidization.

Just what success this reagent will have on a large scale remains to be demonstrated as it has never been nsed as regular practice in a commercial mill. It is said to retain practically all of its virtnes in the return water, undergoing scarcely any decomposition with nse. We are reliably informed that pitch in all of its various aspects was thoroughly tested ont in the many experiments which were conducted at the Mellon Institute and was fonnd not as desirable as some other reagents, bnt the experiments of Mr. Luckenbach have no doubt been much more exhanstive.—Engineering & Mining Jonrnal.

LOW-TEMPERATURE DISTILLATION OF ALBERTA COALS.

A despatch from Edmonton states that an English syndicate, in which Lord Morrison, formerly Prime Minister of Newfoundland is interested, proposes to acquire coal property in Alberta to demonstrate the snitability of Alberta coals for low-temperature distillation, yielding by-products and residnal fnel.

Mineral Production in Quebec During 1920

In contributing a forecast of the mineral production of the Province of Quebec during 1920 to New Year issue of the "Canadian Mining Journal," Mr. Theo. C. Denis stated that "whether or not the total figures of 1920 would be found to exceed those of 1919 or not would depend on the value of the building materials," and it is therefore interesting to note that the 1920 value of these materials totalled $12,054,857, compared with $8,090,651 in 1919, an increase of fifty per cent. The Quebec report for 1918 commented on the serious effect that the war had upon the output of building materials in the Province, the value of these having declined from 8 million dollars in 1913 to 5½ million dollars in 1917 and 1918. The 1920 achievement not only shows a remarkable recovery from the depression of the war years, but it exceeds the best of the pre-war years.

The value of the annual production of Quebec continues its unique ascension, reaching $28,392,939 in 1920, which compares with $13,119,811 in 1913, itself the record year to that date. Asbestos continues to be the dominating product of the Quebec mines, and is elsewhere referred to in detail in this issue.

The mining industry of the Province employs 8,806 persons (or 7,428 persons working 300 days per year), earning $9,820,431 in wages, being at the rate of $1,322 per person per year, the highest yearly average yet recorded, comparing with $1,025 in 1919, and only $593 in 1915. The rate of common labor has risen from $1.75 per day in 1915 to $4.25 in 1920.

The fatal accident rate in 1920 was high, being 3.52 per thousand persons employed, which compares with 0.6, 4.5 and 1.67 in 1917, 1918 and 1919 respectively. It is significant that out of 25 fatal accidents, 17 took place in open pits and quarries, and were chiefly associated with rock-falls and slides. The Superintendent points out that some of the open pits are 300 feet deep, and suggests special precautions to remove all loose rock after blasting. The remarks of the Superintendet on preventable causes of accident are well worth the attention of the miners of Quebec, as the accident rate is altogether higher than it should be, or could be. The full statistical information given in regard to accidents is a very commendable feature of the Mines Report.

Copper and Sulphur Ores.

Production in 1920 was 15,186 tons, comparing with 53,965 tons in 1919 and 125,446 tons in 1918. The competition of sulphur from the Southern States, and its reduced market price, combined with low price and lack of demand for copper are chiefly responsible for the small production of pyritons ores in 1920. Production was almost entirely from the Weedon mine.

Chromite.

The production in 1920 was 10,585 tons compared with 8,184 tons in 1919, and 23,000 tons in 1918. In view of the market conditions the slight recovery in output in 1920 is satisfactory, but competition from Rhodesia and New Caledonia has resumed much importance.

Gold and Silver.

As gold production in Quebec has so far been confined to a by-product of copper and zinc-lead ores, and as the output of these ores has been reduced by market conditions, gold recovery shows a decline, being 935ozs. gold and 57,714ozs. silver, compared with 1,446ozs. gold and 127,223ozs. silver in 1919. Development in the Lake de Montigny district has not proceeded beyond assessment work.

Molybdenite

No production of molybdenite was recorded in 1920, for which market conditions were entirely responsible. Preparations for output have been proceeded with during 1920 at several points.

Magnesite.

Production increased from 9,940 tons in 1919 to 17,941 tons in 1920. The Scottish Canadian Magnesite Co. and the North American Magnesite Co., of Grenville, and the International Magnesite Co. of Harrington Township, are the three producers reporting. The Grenville magnesite contains more lime than is considered desirable, and experiments carried on at the ore-testing laboratories of the Mines Branch at Ottawa indicate the possibility off "producing caustic magnesia, low in lime, from the high-lime magnesites at the same time obtaining a by-product, dolomite lime paste suitable for structural purposes or for utilization in the manufacture of sulphite pulp." Experiments on a larger scale are being proceeded with in Ottawa. It seems likely that the production of magnesite in Quebec is a permanent industry.

Graphite.

There was no production of graphite in Quebec in 1919, but 466,420 pounds was produced in 1920. The Quebec Graphite Co., after a prolonged shut-down, commenced in the concluding part of 1919 to install the Callow process of flotation, and resumed miling at Buckingham in May, 1920, with satisfactory recoveries. This company has gone into the manufacture of finished products, and are now marketing lubricants and pastes, and intend to make electrodes, greases and stove-polish. While the flotation process of graphite recovery as applied at the plant of the Quebec Graphite Co. and also by the Consolidated Graphite Co., both in Buckingham Township, the selling price of graphite is depressed by competition of accumulated stocks in Ceylon and elsewhere.

Mica.

Value of mica produced was $281,729 in 1920, compared with a value of $224,988 in 1919. Mica statistics are stated by the Report to be indefinite, because of the difficulty of grading mica into statistical divisions. 1919 production, which brought a smaller yield in money than 1920 production, was estimated at 3,853,265 pounds, whereas 1920 production is estimated at only 1,496,399 pounds. Quebec produced 77 per cent. of the Canadian output of mica in 1920, comparing with 82 per cent. in 1919.

Miscellaneous Products.

Silica rock shows increased production with 24,865 tons. Feldspar amounted to 849 tons, some of it being shipped to France as "dental spar" for the manufacture of artificial teeth. A company is being formed to exploit a deposit of marl earth at Millette Lake for the manufacture of whiting, and the Report lists a number of occurrences of deposits of fresh-water marl in the Province.

Building Materials.

Quebec is rich in building materials, particularly deposits of building stone from which dimension pieces of any desired size can be obtained. Ornamental marbles are found in many places and largely worked, marble to the value of $250,000 having been produced in 1920.

A deposit of red slate, associated with ornamental marble in the seignory of St. Joseph de Beauce, is being crushed by the British Canadian Marble Co. for surfacing roofing shingles. Cement and brick production account for 30 per cent. of the value of building materials in Quebec during 1920, and show an increase of 55 per cent. over the values of 1919.

The Mines Report, as is usual, is notable not only for the extent and accuracy of its information, but for its generally helpful character.

While Quebec is not a large mineral producer, yet her minerals and their exploitation are associated with certain specialized requirements of high development of civilization and the mechanical arts. Other phases of Quebec mining, such as the use of building materials, reflect urban growth and increase of population, and, in recent years, Quebec has not been remarkable for prospecting expeditions or new finds of mineral, although the Province has a northern hinterland which is less known than any part of Canada today. It seems altogether likely that Quebec will continue to record annually increasing extent and value of mineral production.

ASBESTOS MINING IN QUEBEC.

The Annual Report of the Superintendent of Mines of Quebec for 1920 puts the value of asbestos and asbestic at about 53 percent of the total value of the mineral production of the province in both 1919 and 1920.

The relation of the value of asbestos production to the total mineral value of Quebec for the past ten years is shown by the following table.

Year.	Value of Asbestos. $	Percent of Total Mineral Production Value. %	Average Value of Fibre per ton. $
1911	3,026,306	35	29.60
1912	3,059,084	26	27.52
1913	3,830,504	29	28.04
1914	2,895,935	25	26.96
1915	3,544,362	31	31.33
1916	5,182,905	39	38.87
1917	7,198,558	44	52.45
1918	9,019,899	48	63.35
1919	10,932,289	53	80.47
1920	14,749,048	52	81.89

The asbestos content of the rock mined has varied during this ten year period within quite narrow limits, the highest value being a content of 117.3 pounds per ton of rock in 1918, and the lowest 96.9 pounds in 1915. The average of the period is 108 pounds of asbestos recovered per ton of rock mined, the figure for 1920 being 109.1 pounds per ton.

The average annual production over ten years has been roughly 130,000 tons of fibre, so that the production of 179,891 tons of fibre in 1920 is 38 percent above the ten-year average. The annual figures are shown below.

Annual Shipments of Asbestos Fibre, Net Tons.

1911	102,224	1916	133,339
1912	111,175	1917	137,242
1913	136,609	1918	142,375
1914	107,401	1919	135,862
1915	113,115	1920	179,891

Inspection of the foregoing figures will disclose that asbestos production in Quebec has borne a very exact relation to the price of fibre, and 1920 was a year of high prices and heavy demand. The Superintendent of Mines states that up to September the supply could hardly keep up with the demand, and that the mine sheds were bare of stocks. Towards the end of the year the market reflected the decrease in business in the United States, and during the first months of 1921 curtailment of production became general.

Exports of crude and mill stock during 1920 showed the following distribution, condensed from the Report:

Destination.	Tons.	Percent.
United States	115,283	75.6
United Kingdom	11,881	7.8
Europe	18,057	11.8
Other countries	7,519	4.8
	152,740	100.0

Virtually all the asbestos sand and waste, to the extent of 36,218 tons out of 36,303 tons, was exported to the United States.

Modernisation of the Asbestos Mines.

A significant feature of the Superintendent of Mines Report is the progression of asbestos extraction from open-pit mining to regular underground workings, and the general modernisation of the mining equipment. Derrick-hoisting is being superseded by inclined tramways and shafts. An interesting example is the mine of the Canadian Johns-Manville Company at Asbestos. Here the quarry is laid out in wide benches, the rock being loaded into cars of standard gauge by steam-shovels and hauled in trains to the mill by steam locomotives on a maximum grade of three percent. The layout is similar to the approved method of mining iron-ore in the Lake Superior ranges, although of course the material is a different one, and the magnitude of operations not so impressive.

Another mine, the British-Canadian mine at Black Lake is in a transition stage between the quarry and the mine, the Report stating that the previous method of hoisting by cable-derrick will soon be entirely superseded by the glory-hole and underground haulage.

In this mine as also in the other mines of the Asbestos Corporation of Canada at Thetford, there has been a further utilisation of electric power, all the steam locomotives at the King Mine having been superseded by electric locomotives, which, apart from the considerations of uncertainty of coal supply that have led to this change, is in line with approved mining practice. At the British-Canadian mine it is proposed to use electric-trolley locomotives for underground haulage through the tunnels. At the Consolidated Asbestos Limited mine at Thetford (formerly the Jacob's Mine) underground haulage is done by storage-battery locomotives, with charging installation underground.

At the Pennington Asbestos Company's mine, Robertson, an electric hoist and an inclined tramway is replacing the steam locomotives formerly used for haulage.

There seems no reason why the completest electrification of the asbestos mines should not be generally adopted; and a good many reasons why it should.

The use of modern drilling tools is also noted. The Canadian Johns-Manville Co. are using turbo-rotator drills, made by the Denver Rock-Drill Mfg. Co., drilling 2 inch holes up to 40 ft. in depth and the Quebec Asbestos Corporation at East Broughton is using a Sullivan submarine drill that can drill a 3-inch hole to a depth of 75 feet.

The report does not mention the quantity of explosives used in blasting, but as these deep holes are heavily charged, the total quantity must be quite large.

While the war stimulated the demand for asbestos to a noteworthy extent, the experience of 1920 indicates that the uses of asbestos are now so various and established that there is no likelihood of any serious decline in the demand for Canadian asbestos. Indeed the uses of asbestos are growing, and the quantity so far ascertained to exist in other countries is not sufficient, nor is the quality of sufficient excellence, to warrant any serious fears for the future of the market for Canadian asbestos.

ASBESTOS DEMAND.

A market letter from New York advises that asbestos companies having selling agencies in New York are now absorbing the five percent tax of asbestos exports which is imposed by the Quebec government, from which it is evident that this tax must have been separately billed to American customers during the period that it has been in force. The change seems a not undesirable one. Enquiries for asbestos are stated to be fifty percent greater than last month, and no material decrease in the selling prices of crudes or fibre is looked for, as the mines are running on very curtailed production, or are entirely shut down, and no exceeding of demand by production is looked for.

B. E. STEEL STAFF APPOINTMENTS.

D. H. McDougall, Vice-President of British Empire Steel Corporation, announced under date of July 15th, appointment of George D. Macdougall, latterly General Superintendent of the Nova Scotia Steel & Coal Company, as Chief Engineer of the Corporation, and of A. McColl, for many years Secretary of the Nova Scotia Steel Company and Assistant to the President, as General Manager of the Nova Scotia Company, including the consolidated properties of the Corporation centred around New Glasgow.

Mr. Macdougall's experience has been of a nature to fit him exceptionally well for the wide and onerous duties that he will have to undertake as Chief Engineer of the Corporation, as these will extend over an area and will include a variety of engineering problems unique in Canadian corporate industrialism.

Mr. Macdougall, who was born in 1873 at St. Peter's, Cape Breton, graduated from McGill in 1895 with the degree of B.A.Sc. (with honours) in mechanical engineering, and the following account of his career following graduation is taken from "Institute Notabilities" series in the Bulletin of the C. I. M. & M. of June 1920.

"Beginning with the Robb Engineering Company of Amherst, N.S. Mr. Macdougall went across the line, and was engaged in shop and engineering work for the G. F. Blake Manufacturing Company, of East Cambridge, until 1898. For the next year he was chief draughtsman on marine engineering for the Fore River Ship & Engine Company, Weymouth, and later was in charge of power-house design and erection with the Edison Illuminating Company of Boston. In 1900 he went with the Dominion Iron & Steel Company as master mechanic and assistant manager of the ore-mines at Wabana, Newfoundland, but returned to the United States at the end of 1901 to become assistant chief engineer of the Lackawanna Steel Company, Buffalo, and later mechanical superintendent. From 1904 to 1909 he was with the Steel Company at Sydney, two years as mechanical superintendent and three as chief engineer, following which he was superintendent of construction for the Canada Iron Corporation at Midland, Ont. At the beginning of 1911 he returned to the Dominion Company as mechanical superintendent, and in 1916 became assistant general superintendent, retaining this position until in 1918 he became general superintendent of the Nova Scotia Steel Company."

Mr. Macdougall is President of the Mining Society of Nova Scotia, a vice-president of the Canadian Institute of Mining & Metallurgy, and a member of the Engineering Institute of Canada. He was also the first president of the Nova Scotia Accident Prevention Association, and is Grand Master of the Freemasons in Nova Scotia.

Mr. A. McColl's appointment comes naturally after a term of service with the Nova Scotia Steel Company, and its predecessors, that extends from his graduation from Dalhousie and Boston Tech. to the present date. He has seen the Scotia Company grow from the humblest beginnings, and has taken an active part in that development. The official statement in connection with Mr. McColl's appointment announces that he will have his headquarters in New Glasgow, and will direct the operations of the Steel Plant at Trenton, the Eastern Car Company and the Acadia Coal Company, and that, at a later date, the Springhill collieries, now managed from Glace Bay as a district of the Dominion Coal Company, will be attached to the New Glasgow management, thus consolidating all the mainland operations of the Corporation, which are not far apart and are physically very similar.

These appointments are in continuation of the policy of utilising the best executive material in the staffs of the consolidated companies, so as to restore former efficiency and give the Corporation the benefit of technical direction by specialists already trained in and acquainted with local conditions.

CHANGE IN ACADIA COAL COMPANY MANAGEMENT.

Mr. J. J. McDougall has been appointed Assistant General Manager of the Acadia Coal Company, succeeding M. F. E. Notebaert in the operating management of the Acadia collieries, who is returning to Belgium. Mr. McDougall was for a number of years the Resident Manager of the Wabana Mines of the Dominion Iron and Steel Company in Newfoundland, and has for the past two years been assistant to Mr. Notebaert at Stellarton.

Mr. Notebaert, during his technical management of the very difficult property of the Acadia Coal Company at Stellarton, has established his professional competency, and leaves the mines in better order, from an engineering standpoint, than they have ever been in. A succession of fires and explosions has been the record of the Acadia mines throughout their history, and during Mr. Notebaert's term of office, one disastrous explosion and a number of fires have occurred, the fighting of which has called for the most expert knowledge and skilful handling, and much personal courage, in all of which Mr. Notebaert distinguished himself. A series of borings, carried out under Mr. Notebaert's direction, fixed with accuracy the number and position of some nine coal-seams underlying the lowest worked seam in the Acadia areas, and corroborated the report of Hartley and Logan published by the Geological Survey in 1869. Previous failure to confirm this report

had led to the belief that the Acadia property was much less valuable than is actually the case. The demonstrated extent of good-quality coal in this property, and the better control over the fiery nature of the coal and associated shales in a remarkable concentration of burnable deposits which systematic fighting and control of the fires has made possible, have put the Acadia Coal Company's mines in very much improved position as producers of coal. The strata column in the Stellarton field includes 16 coal-seams, aggregating 189 feet in thickness in a depth of 2,780 feet, mostly composed of shales that are approximating to oil-shales and are in many instances highly carbonaceous and gaseous. The troubles with mine fires in this district in the past have largely arisen from failure to extingush fires in the coal-seams that have, because of the curious nature of the strata, not remained confined to the seam in which they originally started.

BELGIAN-AMERICAN COKE OVENS CORPORATION.

A corporation has been organized in New York, headed by Thomas F. Ryan, to introduce and operate in the United States the Piette by-product coke oven. Hector Prud'homme of Brussels is vice-president. Mr. Prud'homme was for several years General Manager of the Acadia Coal Company, at Stellarton, Nova Scotia. The technical part of the organization will be composed of Belgian engineers, and this will be added to by appointment of American engineers and executives.

EXPLOSIVES MANUFACTURE IN CANADA.

The report of the Dominion Bureau of Statistics on the explosive industry in Canada for the year 1918 is interesting as a record of a phase of munitions activity, and the figures of that last year of the war, while impressive as showing what the country can do under the compulsion of war necessity, are not representative of normal business in the explosives industry in Canada.

The value of explosives made in Canadian factories in 1918 is placed at $1,477,828, and the value of exports of cartridges, explosives and detonators from Canada in that year is placed at $272,913,776. There is therefore a very wide spread between the two sets of figures, representing, presumably, costs of making explosives into shells of various types, and taking in probably the product of the previous year's output.

The report states that over five million dollars was spent in Canada during 1918 in the construction of new buildings and the repair of those already constructed. The investment in plant and equipment in the explosive industry in 1918 was nineteen million dollars. No doubt, by this time, much contraction in the scope of the explosive industry has taken place, but it is evident that there should be no difficulty in supplying Canadian industries with explosives in ample quantity in ordinary times.

The Bureau of Statistics is co-operating with the Explosives Division of the Mines Branch in the obtaining of statistical data, and a joint form for collection of such information is being used. Of interest to the coal-mining industry in Canada is the use of over five million pounds of toluol in 1918.

BITUMINOUS COAL PRODUCTION IN THE UNITED STATES.

The weekly bulletin of the United States Geological Survey on coal production in the United States contains the following comparison of the production of bituminous coal during the first half of 1921 against corresponding production in nine years preceding.

Year	June production	Cumulative production to June 30
1913	37,405,000	226,000,000
1914	31,412,000	205,000,000
1915	33,957,000	193,000,000
1916	37,742,000	246,000,000
1917	46,834,000	273,000,000
1918	51,138,000	282,000,000
1919	37,034,000	214,000,000
1920	45,114,000	258,000,000
1921	33,852,000	196,000,000

If the second half of the year 1921 shows no greater output than the first half, the total for the year will be less than 400,000,000 tons. The last year in which the country required less than 400,000,000 tons was 1909.

Examination of the table shows that up to the end of June, the year 1921 was:

9 million tons behind 1914
18 million tons behind 1919
30 million tons behind 1913
50 million tons behind 1916
62 million tons behind 1920
77 million tons behind 1917
86 million tons behind 1918
3 million tons ahead of 1915

Compared with the average of the eight years preceding, 1921 is 41 million tons behind. Before concluding that this subnormal production indicates a future shortage, the greatly decreased consumption of coal caused by the depressed condition of industry in general should be considered. Cumulative production is but little less than that in 1914, which also was a year of general business depression. In that year no shortage of soft coal occurred. It is even slightly ahead of the first half of 1915 when the allied war orders had not begun to stimulate the demand for coal. On the other hand our national requirements normally increase at the rate of from 10 to 20 million tons a year, so that what was sufficient in 1914 would ordinarily be far from sufficient now.

PORT ARTHUR NOTES.

By J. J. O'CONNOR.

Two by-laws were submitted to the ratepayers of Port Arthur on the 27th July. One confirming the sale of two hundred acres of water-front property by the City of Port Arthur, to the Palatine Mining & Development Company, for the purpose of erecting thereon ore-docks, and an iron and steel industry, together with allied industries, the other confirming a tentative agreement made by the City Council, with the above company, placing a fixed assessment on its blast furnace for a period of ten years.

Both by-laws were carried by practically a unanimous vote, being the largest vote of the kind ever registered here, showing the confidence the local people have in the iron-ore resources of this district, and the possibilities of an iron and steel industry at this point.

Memorandum on Part of the Goudreau Gold Area

By A. G. BURROWS, Ontario Dept. of Mines.

In accordance with my instructions of June 22nd I proceeded to Goudreau station, on the Algoma Central railway, to examine the recent gold find on the Murphy claims which are located in township 28, range 26 of the Michipicoten area. This township is included in the lands grant of the Algoma Central railway and claims staked in it are recorded at the company's office at Sault Ste. Marie.

Means of Access.

The area is most conveniently reached from Franz, a station at the crossing of the C. P. and A. C. railways. Goudreau, which is the nearest railway station to the gold discovery, is 17 miles southward from Franz; the Murphy claims are about 3½ miles southwestward from Goudreau. The camp is reached by a good canoe route which starts one-half mile south of the station. The route, which requires about two hours' travelling, is by way of Jackson, Long, Doherty, Aitken and Murphy lakes. The longest portage is about one mile. The find is located near the north shore of Murphy lake on mining claims 407 and 408.

Discovery.

The discovery was made by Thos. Murphy of Goudreau while engaged in fur trapping in the month of April. A. V. J. Selkirk, merchant of Franz, and Jas. Perry, Goudreau, were early partners with Mr. Murphy; later, several others were given interests in the claims. Twelve claims in the vicinity of Murphy lake were staked by these gentlemen. At the time of my visit the claims were being examined by C. G. Daimpré for A. R. Porter, of Toronto. Mr. Porter was on the ground and before leaving procured an option on that part of the property on which the gold-bearing veins are located.

Geology.

The rocks in the area to the southwest of Goudreau are dominantly basic volcanics of Keewatin age. Rocks of this character were observed from Goudreau all along the portage route to Murphy lake. The ellipsoidal structure, along with amygdules so characteristic of much of the Keewatin, is frequently seen. In places the basic lava contains considerable carbonate and is lighter-colored than the normal dark-colored rock. Most of the lavas are altered to schist which has a general strike nearly east and west. With the lavas there is a small amount of banded iron formation, magnetite and silica, seen on claims 408 and 412. In the vicinity of Goudreau the main iron formation zone is prominent. Two of the large iron pyrites properties, the Goudreau mine of the Nichols Chemical Company and the Rand Consolidated Mines, are near Goudreau; neither of these is in operation at the present time.

With the basic volcanics in the vicinity of Murphy lake there are several intrusions of quartz-porphyry or quartz-feldspar-porphyry; these acid rocks are generally schistose like the darker lavas. Some of the quartz-porphyry occurs as dikes crosscutting the strike of the lavas flows. One small mass of porphyry intrusive into the basic rock can be observed on the north line of claim 407.

A mass of grey granite, gneissic in places, occurs on several claims to the west of the gold discovery.

Several narrow dikes of diabase with a N-S strike cut the older formations. One of these, along the east line of claim 459, is an olivine diabase. The rock relationships are illustrated in the attached geological sketch map.

Veins.

The first discovery of gold was made in a quartz vein in the southeasterly part of claim 408 where, for a distance of about 20 feet along the hanging-wall side of the vein, there are a number of showings of quite coarse gold in the quartz. The quartz vein has been traced by trenching and outcrops for about 800 feet on claim 408. It strikes approximately N. 30 deg. W. and the dip, where observable is from 60 deg. to 80 deg. S. It varies in width from seven inches to three feet. Along the quarts vein the wall rock has been altered in places to rusty schist containing ankerite and sericite and carrying quartz veinlets together with sulphides at different points. The width of the altered rock appears to vary greatly, but, owing to the small amount of cross-trenching, the width of the possible mineralized wall rock could not be determined. The hanging-wall contact of the quartz and schist is more definite than the footwall. At the location of the gold showings, the vein, including the wall rock, is about 3 feet in width, while 15 feet to the north is a subsidiary quartz vein a foot in width, to the north of which is a band of ankerite. Twenty feet to the west this smaller vein is only 3 feet from the main vein. The quartz vein in places is well mineralized with the sulphides, pyrites, copper pyrites and pyrrhotite; 150 feet southeasterly from the above showing the quartz vein is about 7 inches in width and, in a thin band of sugary quartz and schist on the hanging-wall, visible gold was seen.

Work has also been done on claim 407 to the east. At the west line, 200 feet north of Murphy lake, a narrow quartz vein about a foot in width has been traced 65 feet; it strikes S.80° E. The wall rock for a few inches is quite rusty and carries sulphides. Visible gold was observed at two points along the vein. About 200 feet easterly from the west line work has been done on a wide ankerite-schist band up to 20 feet in width which carries quartz veins roughly parallel with the ankerite band. It has been traced for 170 feet in a direction S.70° E. No visible gold was observed in this vein, but at one point an assay of $6.00 in gold was obtained over a width of 2 ft. 9 in. of quartz and $4.00 in gold over a width of 5½ ft. of the schist and carbonate, carrying quartz, lying to the north. Owing to the highly altered character of the schist by oxidation, the latter assay is only indicative of the presence of gold which may be concentrated. The quartz vein carries pyrite, copper pyrites, pyrrhotite, and a little zinc blende. It is possible that this easterly vein is the faulted part of the vein exposed on claim 408.

A geological sketch map showing the approximate location of the veins on claims 407 and 408 accompanies this memorandum. A number of assays of samples obtained at points along the veins showed gold values ranging from a few cents to $28.00 per ton. In addition, two assays were made of specimens of quartz carrying a high percentage of sulphides, from a pit a few feet west of the rich gold showings, which gave $31.20 and $48.80 in gold.

The property, however, was not in condition for any

thorough sampling since few cross trenches had been made exposing the walls of the vein and none below the superficial oxidation. The main vein shows high-grade ore for at least 40 feet near the discovery, but extensive work will be required to determine the possible ore shoots along the veins, since large portions of the vein are concealed by drift. C. G. Daimpre is at present examining the property for A. R. Porter of Toronto. Cross trenches and blasting to the unoxidized vein, preparatory to sampling, will be carried on, and it is expected that a shaft will be sunk on or near the rich section of the main vein.

Townships 48 and 49.

A short trip under the guidance of Jas. Cline, a prospector, was made northeastward from Goudreau in townships 49 and 48, range 27. Gold has been discovered on a number of claims between Goudreau station and Goden lake, which lies in the southeast part of township 48.

McCarthy-Webb.—The McCarthy-Webb group of claims 2049, 2050, etc. near Iron lake, has been described by W. H. Collins in his report on the Magpie-Hawk area. Briefly, the rock is a schistose porphyry which, in places, is a quartz-porphyry with a strike N.84° E. mag. Shear zones occur in the porphyry and these are indicated by a rusty surface containing vague quartz veinlets, which is in marked contrast to the white porphyry. The rusty streaks are very irregular in length and breadth, being from a few inches to a few feet in width, containing fine-grained iron pyrites. Gold in a very fine state has been found in the rusty zones. In addition, there are widely separated transverse veinlets of quartz carrying much tourmaline in which coarse gold has been discovered. These veins are more definite than those running with the schist. The property has been sampled several times, particularly in one place, for a length of 100 feet where the rusty condition is most pronounced.

Morrison.—The Morrison claim, 2075, on the north shore of Goudreau lake, is similar to the McCarthy in structure. However, the rusty zones running with the schist are less pronounced, while there are more of the transverse quartz-tourmaline veins. Visible gold has been found in a number of the narrow veins which are parallel to the schist and also in the transverse veins. The main shears strike from N.66° to N.86° E., whereas the cross veinlets strike N. 6° E. The latter vary from a fraction of one inch to 4 inches in width and are too far apart to mine together.

Cline.—A number of claims about 1½ miles northeast east of Pine lake were also visited. Visible gold was seen on claims 2186 and 2189. The rocks are Keewatin schist in which narrow quartz veins have been formed. A shaft was sunk 25 feet on claim 2189 in a quartz vein from 1½ inches to six inches in width in which there is a high percentage of sulphides, and visible gold. The extension of the vein to the west where it was cut by a diabase dike, has not been found.

On claim 2186 there is one narrow rich quartz vein about 5 inches wide in which gold has been found over a length of 20 feet. A second vein from 8 inches to 3 feet wide occurs on the claim. It consists of quartz and schist on which a 5-foot pit has been sunk. Material from this vein showed much gold on panning. Owing to the heavy drift covering it is difficult to trace the veins any distance.

Some rusty shear zones were also observed on claims 2183 and 2184. On claim 2184 in one trench the rusty zone is 15 feet in width, which diminishes rapidly to the west. Some visible gold is reported near the north wall. Sufficient work has not been done on any of these claims to determine their value.

Literature.

The geological reports on the Michipicoten area for the greater part refer to the iron ranges. These reports include those by W. H. Collins, J. M. Bell, A.P. Coleman, and A. L. Parsons. W. H. Collins in his report on the Ore Deposits of Goudreau and Magpie-Hawk Areas in Michipicoten District, Geological Survey of Canada, Part E., 1918, refers to the gold area to the northeast of Goudreau. His geological map of the Goudreau Pyrite Area extends westward to within a mile and a quarter of the Murphy claims.

Ellis Thomson is at present in the field for the Geological Survey continuing the mapping of the area begun by W. H. Collins. His work will include an examination of the area southwest of Goudreau in which the Murphy claims are located and the area near Pine lake.

THE McINTYRE MILL.

When the treatment of ore was begun at the McIntyre, the chief source of ore was from deposits near the southern boundary of the property. The present mill and cyanide plant grew up close to the shafts on the south shore of the lake. Then as development proceeded, the source of ore became to a larger and larger extent the deposits north of the lake. For some time consequently it has been necessary to bring the ore across the lake from the mine. Now that additional milling facilities are being arranged for, the management has had seriously to consider whether to build a complete plant near the main hoisting shaft or to make an addition to the present mill and continue to bring ore across the lake. It appears that a compromise plan has been decided upon and that the procedure will be to install working machines on the mine side of the lake and utilize the present cyanide treatment plant, with necessary additions. The pulp from the grinding mills will be brought across the lake for cyaniding.

At present the ore at the McIntyre mill is crushed in cyanide solution. In the proposed new method of treatment, however, the ore will be crushed in water and treated chemically before cyanide is added. This breaking of the operation into two stages will therefore confine the cyanide treatment to the pulp and makes a division in process that will fit in well with the proposed division in plant.—R. E. H.

LAKESHORE.

Treating less ore than in April or May the Lakeshore produced more gold in the month of June than in the two previous months together. In June 1,656 tons was treated which yielded $52,539 an average of $31.73 per ton. As the ore treated during the early part of the year was considerably lower grade than that previously treated, the June record is of particular interest. Drifting during June, was carried on at the 400 ft. and 600 ft. levels.

The comparatively low-grade block of ore which has been responsible for the lower average recovery for some time has evidently been worked out. As much of the ore treated comes from drifts or drift stopes it would appear that good results are being obtained in development at both the 600 and 400 ft. levels as well as in stoping.

Flat Screens

A Discussion of Screening Capacity.

JOHN S. WATTS, New Glasgow.

The question is often raised as to what area of screening surface is required to screen a given tonnage of a given material, the idea being that for any given material, a certain number of tons can be screened per square foot per hour, and that if this tonnage can be found by reference to a technical text-book, all that remains is to divide the maximum tonnage per hour, to be screened, by the tons that can be screened per square foot of screening surface per hour, as given in the text book, and the answer will be the area of screen required.

For reasons that will appear later on in this article, it is impossible to state the capacity per square foot of any screen on any material until all of the varying factors, many of which are not controlled by the screen at all, are known and their effect on the screening capacity rightly determined. It is therefore not possible to give an empirical formula for screens, and for that reason nothing but the vaguest, if any information, is given in the reference books, and the subject is one that has had very little attention by technical writers.

On the other hand, the action of any particular type of screen can be subjected to analysis, and from a study of the laws governing it, a close approximation to the actual capacity can be calculated, especially so if we have data available of the capacity of a similar screen. Great care must however be taken in basing calculations for a proposed screen on the performance of an existing screen, to make due allowances for all the conditions which effect the capacity of a screen, as it is easily possible for a slight change in one or other of the factors to reduce or increase the screening capacity by one hundred per cent or more.

The first point in deciding the capacity of a proposed screen is to take into account only that area of the screen which is actually covered by the stream of material. That is, if a belt conveyor two feet wide, is delivering onto a screen six feet wide, there will be two feet of screen at each side which is not covered by the material, and is therefore of no value, for that length which the material travels along the screen until it spreads or thins out to the full width of the screen, if indeed it ever does.

On the other hand, it is absolutely essential for the efficient removal of the fines, that the screen be sufficiently wide and long so that the stream of material will, before leaving the screen, be reduced in thickness to that of the size of particle that will pass through the screen. This because every particle of the material must come into actual contact with the screen, it being obvious that if the stream is any thicker than one individual piece, some material that should pass through the perforations may ride across the screen on top of the larger particles.

At the same time it is obviously useless to make a screen wider than the width to which the stream will spread itself out, and owing to the perforations in the screen, particularly in wire-cloth screens, tending to prevent any sideways travel of the material, it is useless to make the screen much wider than the width of the stream as delivered to it, unless some measures are taken to compel the stream to spread out. The methods used to ensure the stream being spread out to cover the full width of the screen will be taken up later in their proper place.

Presuming then that we having determined the maximum effective width that we can give the screen, the thickness of the stream will be determined by calculating the sectional area of the stream by dividing the maximum cubic feet of material passing over the screen per minute, by its velocity in feet per minute. This area divided by the width of the stream will be its initial thickness, assuming that the feed to the screen is in a stream of equal thickness throughout its width. If, as often happens, the stream is deeper in its centre than at its sides, the side portions of the screen will not get their proper proportion of the material, and the screen will require to be made long enough for the central portion to screen the thickest part of the stream.

To determine the length of screen to handle a stream of a given thickness as calculated above, it is necessary to study just what happens while the stream is traversing the length of the screen. In a general way as the stream advances, the fines in the strata next to the screen will fall through the perforations, and the fines above gradually percolate down through the stream, until they ultimately reach the screen and also fall through it, thus reducing the thickness of the stream by the removal of that percentage which will pass through the screen holes.

The minimum length of the screen then, must be that length through which the stream will travel along the screen in the time which it will take the particles of fines on top of the stream to travel down through the stream, and reach to and fall through the perforations. It is clearly impossible to determine the time it will take the fines to pass through the stream, except by measurement on some existing screen working on similar material, or by experiment. Where it is possible to do so, the best method is to observe the length of screen required to effectively remove the fines from a given thickness of stream, choosing the screen for observation that is nearest in type to the proposed one, and on material as near as may be the same as that to be screened. This length being once accurately determined for a given material, in a given mixture as to sizes of particles, on a given type of screen, with given perforations, we can calculate the screen required for any output of the same material with absolute certainty, if the other factors remain the same.

That is the width of the stream of material as delivered to the screen will fix the width of the screen, and calculation will give us the thickness of the stream as explained above. The length of screen required will be in direct proportion to this thickness, being in the same proportion as that determined by the test suggested above, so long as the other conditions outside of the thickness of stream remain as before. As the condition will very rarely be the same precisely it will be necessary to observe what the effect of any variation of these conditions will be upon the capacity of the screen.

A mixture containing a high percentage of large particles will allow the fines to pass through the stream

much more quickly than one which consists of particles nearly uniform in size.

The larger the perforations in the screen the more rapidly will the screening be done. The nature of the material itself also varies the length required to screen, as a sticky material, especially if wet, will take much longer than a dry hard material will.

The thickness of stream which can be screened on a certain length of screen, varies practically in direct ratio with the size of perforations in the screen, that is if we have two screens of the same length but one having perforations four times as large as the other, the screen with the large perforations will screen a stream four times as thick as the other, the other condition being equal.

The greater the percentage of material which will pass through the screen, the more rapidly will the screening be performed, or in other words, the shorter will be the length of screen required for a given quantity, the length of screen being about in inverse proportion to the percentage of fines.

The capacity of the screen may be reduced by the choking of the perforations; the more vibration a screen is subjected to, the less choking will occur, and a perforated plate is more liable to choke than a wire-cloth screen, or a fixed bar-screen. For a wire-cloth screen it is almost always essential to have some kind of vibration to prevent choking, and for material that is at all wet or sticky, a knocking screen is best, as the jarring of the screen shakes the fines loose from the screen, which would otherwise soon fill up and become useless.

The delivery to the screen is an important factor, as if it is at all intermittent in character, the screen must be calculated to take care of the maximum feed, and not of the average, otherwise when a sudden increase in the feed occurs, the screen will allow some of the fines to pass over into the coarse. This condition may be alleviated somewhat, and the stream also widened and thinned at the same time, if it is possible to have the delivery made by a chute fitted with a gate, the chute being widened out at the bottom to the full width of the screen, and the gate set to leave an opening under it, just sufficient to allow a steady stream to pass through of an even thickness.

If the velocity of the material over the screen can be made greater than that of the feed, the stream will in increasing its speed, thin out and so accelerate the screening, and it is therefore the speed of the material over the screen that must be used in calculating the thickness of the stream, and not the speed of the feed. At the same time the velocity of the material over the screen must not be so great that the fines will acquire sufficient momentum to jump over the perforations. This velocity must never exceed 300 feet per minute, and is better kept below 200 feet per minute. To make sure of preventing this jumping over the holes, they are in perforated plates usually slot-shaped, being three or four times longer measured along the chute than they are wide measured across the chute.

To summarize, the procedure is to determine by calculation the speed of the stream over the screen, and from that the thickness of the stream that will give the required output, the width being already fixed by the feeding arrangements to the screen. From the best data available or by test on the screen nearest like the under consideration, decide on what length of screen will handle this thickness.

In the absence of any more exact information, it may be taken that under fair average conditions, screening rock that is dry and not sticky, a screen 9 feet long with ¼ inch perforations will screen a stream 12 inches thick. As stated above, the thickness of stream that can be screened varies as the size of the perforations.

UNITED STATES PRODUCTION OF FLUORSPAR IN 1920.

The total quantity of fluorspar reported as shipped from domestic mines in 1920 according to figures compiled by Hubert W. Davis, of the United States Geological Survey, was 18,778 short tons, valued at $4,718,547, which shows an increase of 35 per cent in value as compared with the figures for 1919. The general average price per ton f.o.b. mines or shipping points for all grades of spar in 1920 was $25.26; in 1919 it was $25.49.

The total quantity of merchantable spar recovered in 1920 was 201,372 short tons, an increase of 31 per cent over 1919.

Stocks of spar at mines or shipping points, mainly in Illinois and Kentucky, amounted to 41,784 short tons, an increase of 31 per cent over 1919.

Imports and Exports.

The imports of fluorspar into the United States in 1920 were 24,612 short tons, valued at $265,630, an increase over 1919 of 254 per cent in quantity and of 147 per cent in quantity and of 147 per cent in value. Of the imports England supplied 69 per cent, Canada 29 per cent, Germany 1.6 per cent, and Australia and British South Africa supplied small quantities.

The exports of fluorspar from the United States Geological Survey by the producers, amounted to 2,764 short tons, valued at $65,475. All the fluorspar exported was sent to Canada.

The imports of fluorspar during the first four months of 1921, the greater part of which was brought from Canada, amounted to 4,049 short tons, valued at 339,990. The figures showing the imports were compiled from the records of the Bureau of Foreign and Domestic Commerce, of the Department of Commerce.

Consumption and Stocks.

Figures furnished by steel manufacturers who produce about 75 per cent of the output of basic open-hearth steel show that the steel industry consumed about 117,000 short tons of fluorspar in 1920 and that the stocks of spar on hand January 1, 1921, at all steel plants were about 66,600 short tons. From January 1 to April 30, 1921, about 22,600 tons of spar was consumed by basic open-hearth steel plants. Figures showing the shipments of domestic fluorspar to steel plants during this four months period are not available, but the total was evidently small, and of the 4,000 tons imported practically all has been taken by steel manufacturers.

ENORMOUS RESERVES OF LIGNITE IN ALASKA.

The reserves of lignite in the Nenana region, Alaska, are estimated by the United States Geological Survey to be nearly 10,000,000,000 tons, which exceeds by nearly 3,000,000,000 tons the estimate made a few years ago, on the information then available, of the total quantity of lignite coal in the Territory. The new estimates, which are very moderate, indicate that the quantity of coal available in the Nenana coal field is greater than that in all the other surveyed fields of the Territory.

British Columbia Notes

Stewart, B. C.: Work on the tramway to the Premier Mine is being hastened at all high-level points in order that a possible early snowfall will not retard progress. This finished what is to be done at lower points along the line will receive attention. Some 70 of the ore buckets to be used on the line have arrived. About 46 miles of cable will be used on this aerial transportation system. Much of it is on hand and has been distributed along this line. — The Lake View Group, Glacier Creek, Bear River Section, is being re-opened. The old workings are being cleared out and it is possible that a shipment of high grade silver bearing ore will be made shortly. — On the Silverado, of the same District, a 40 foot tunnel has been driven and from two to three tons of high-grade ore is being sacked per week. — A tunnel has been commenced on the Montrose and Waterloo Claims of the Red Cliff.

Alice Arm, B. C.: Shipments have commenced from the Dolly Varden Mine. There are about 3,000 tons to be brought to tidewater and thence shipped to the smelter. Development, meanwhile, is to be pushed.

Nelson, B. C.: The Rampolla Group on Lightning Peak, Arrow Lakes District, is being quite extensively developed. Since July 3rd of last year 450 feet of a crossent tunnel has been driven and is expected to cut the vein at depth in a few weeks. In the tunnel 100 feet above for drift is in the ore shoot for 150 feet. The vein there is six feet wide and contains stringers up to 12 inches in width. The Lompy Group adjoins the Rompolla and on it there is a first-class showing, the vein containing values in lead, copper and gold. The property of the Lightning Peak Mining Company, now under lease, is being opened up further by the lessees. The Waterloo has not been worked this year but a start is to be made soon. The Silver Shoot, which is adjacent, also is to be developed. Some work will be done as well on the Detector Group of the same Camp.

Trail, B.C.: Ore receipts of the Smelter of the Canadian Consolidated Mining and Smelting Co. for the week from July 8 to 14 aggregated 6,929 tons. Of this 6,170 tons came from company properties. Other shippers included the Highland, Ainsworth, 28 tons; No. 1, Ainsworth, 38; Surprise Republic, 225 tons; and the Velvet, of the Rossland Camp, 53 tons.

Slocan City, B.C.: The New "Ottawa" Mill, at the Ottawa Mine, Springer Creek, a few miles above Slocan City, has been completed and already is engaged in the treatment of ore. It is specially designed for the economic handling of the dry-silver ore of the Slocan section, the flotation process being employed to a greater extent than probably by any other plant in the country. L. H. Biggar, who designed and under whose supervision the mill was constructed, and L. McPhee are partners in the enterprise. The installation of the plant was started last Fall and the plan is to first treat ore from the "dump" and eventually to develop the mine. This they have under lease and bond from the Consolidated Mining and Smelting Co. — The Black Prince, 6,000 feet above sea level at the junction of Lemon and Springer Creeks, is being opened up and a few cars of ore, already blocked out, are to be shipped. — The V and M, Barnett and German Groups, Lemon Creek, now owned by the McLeod-Slocan Mining Syndicate, of Vancouver, are being developed this Summer, a crew of fifteen men having been put to work some weeks ago. In work done heretofore good showings of ore high in silver and with substantial gold values have been disclosed.

Asheroft, B.C.: Gold is reported to have been taken from placer ground situated on the Douglas Lake Indian Reserve. As Indian lands now are open to location on the securing of a permit from the Indian Agent, and as gold and silver may be taken from such locations, considerable local interest is being taken in the recently staked diggings.

Interesting experimental work is in progress in connection with the Bentonites occurring in the Nicola and Merritt Districts of British Columbia and those found in the Province of Alberta. Samples tested so far indicate that the product of British Columbia does not compare as favorably with the well-known deposits of the State of Wyoming as does that of Alberta. It should be borne in mind that the investigation has only started, that a considerable shipment of the Bentonite of this Province probably will be made to permit further research, and that, as the matter now stands, it seems to be established that Western Canada contains Bentonite, in quantity and of the requisite quality, to hold its own in the market with the output of any other section of America.

The Chemical Industries Committee of the Imperial Mining Resources Bureau speaks favorably of the hydro-magnesite of British Columbia. The Committee will recommend the utilization of this material. The impression, however, seems to be that there is not sufficient of the material available for the manufacture of bricks for lining furnaces etc. as refractories and that, therefore, its quality being exceptional, it must be used for the manufacture of magnesia for chemical pharmaceutical purposes. There is no doubt that the hydro-magnesite of Atlin District (B.C.) would be desirable for the latter purposes because it is unusually pure and it is possible that there are other similar deposits. Then there are the deposits of the Clinton (B.C.) District. Mr. Reinecke, of the Canadian Geological Survey, referring to these, places the total visible amount of first class magnesite at about 173,000 tons. These deposits are shallow lake-bed deposits of 2 to 3 feet in thickness. They have been taken up by different companies and the development being done eventually will accurately disclose the tonnage. The quantity of the Atlin material is given as about 180,000 tons.

Alice Arm B.C.

That 3,000 tons of ore is to be shipped from the Dolly Varden Mine is the effect of a statement recently made authoritatively. The railroad also is to resume operations. No definite announcement, however, has been made regarding the resumption of continuous work at the mine.

The Copper Group of Mineral Claims, Upper Kitsoult River, is to be developed by the Homestake Mining & Development Co. G. H. Gerhardi is in charge. He proposes completing the trail, installing a compressor and driving a tunnel that is expected to strike the surface lead at 200 feet depth. The surface indications are good and George Clothier, government engineer, in his 1918 report spoke favorably of it as a prospect.

Trail work is underway by the provincial government along the Illiance river. This is a promising mineral district hitherto handicapped because of transportation difficulty and the trail will be a boon to prospectors and operators. To the Alice Arm Holdings Ltd., owners of the Bellevue, and to others interested in promising properties in an early stage of development, it will be welcome.

Greenwood B.C.

The Tam O'Shanter Property, situated in Deadwood Camp about four miles from Greenwood, is reported to be looking up, a lead having been struck running high in grey copper and native silver.

Hope B.C.

S. A. Parnall is opening up the "Pipestem," Ladner Creek. His tunnel now is down 150 feet and he expects to strike the lead within another 60 feet. If this property justifies the work now being done it will mean much for the Coquihalla District.

Michael Merrick is working on the "Emigrant," where low values in a large body of ore are said to have been demonstrated.

Work on the "Emancipation" continues. The richness of comparatively small "shoots," off the main vein, persist and the outlet is about the same as at the time Wm. Fleet Robertson, provincial mineralogist, made his report, published in the Annual Report of the Minister of Mines. The large body of ore, carrying uniform values, has yet to be proven but the management is confident of success. Onee this point is demonstrated the rest will be easier than the ease of most properties because transportation and other operating problems are simple.

Trail B.C.

Disadvantages under which the metal industry of British Columbia is laboring because of the "inconsistencies and injustices" of the present tariff on metals and minerals entering Canada are pointed out in a memorial prepared by the Trail Board of Trade and forwarded to the Canadian Minister of Finance.

Referring to the wire rod business it is set out that this material now is imported free of duty "when manufactured by the importers in their own plants." If this situation is continued it is argued that the Trail Smelter Plant, capable of producing 15,000 tons of copper rods per annum, is placed under an unfair handicap. It is asked that rods be protected to the same extent as ingot copper, namely 1 ½ per pound. Without this "there is no chance of the expansion of the refining industry in British Columbia and Canada will continue to pay foreign plants for refining copper used in making rods for Canadian consumption, as well as for rolling the copper into rods after refining."

The extension of the copper item in the tariff to include scrap eopper also is sought because for many purposes it is as good as virgin, a great deal of that left in connection with munition manufacture had been dumped into Canada, and that this might be expected to continue in a modified degree in the near future. Scrap zinc and scrap brass, it is stated, shonld be subjected to a duty for the same reasons are given relative to eopper.

The memorial closes: "In general, the effect of the lack of duty on the above mentioned items is to encourage the building up of refining and manufacturing industries in the United States at the expense of Canada and to delay, for an indefinite period, the establishment of complete copper and zinc industries from the mining of the ore to its use in manufaetured forms."

THE COAL MINES.

Statistics illustrative of the production of the collieries of British Columbia for the first half year of 1921 as compared with the same period of the previous year are not satisfactory. It is shown that coal output has rather considerably declined. In 1920 the first half year's production totalled 1,367,502 tons. This year's figures are 1,231,406 tons. There has been a decline therefore of 136,096 tons. A closer investigation indicates that the decline is not peculiar to any particular section, but no one coal field is responsible for the downward trend of production but that all the collieries are responsible. some to a greater and others to a lesser extent. The Crow's Nest Pass in 1920 up to the end of June produced 433,210 tons; this year's figures show an ontput of 351,759 tons from the same mines. a decrease of 81,451 tons. The Vancouver Island Collieries, or rather the principal producers of the Island field, produced in the first six months of 1920 a total of 857,940 tons while in the same period of this year they have to their credit 799,662 tons, or a decline of 58,278 tons. What explanation lies behind this statement is hard to say unless it be that, in the case of the Island Collieries, the domestic trade has fallen off because of the tendency of the consumers to hold back in purchasing their winter supplies for a possible fall in retail prices, and, in the case of the Crow's Nest Pass, the industries both of this Province and of the adjacent States are not operating on as large a scale as during the early months of last year. Of course the attitude of the domestic consumer would also affect the East Kootenay Collieries but not, perhaps, as much as it does the island operators. In any event there are no labour distnrbances and it is quite possible that the production of the remaining months of the year will show such an increase as to more than overcome what has been lost, as against 1920, during the first half of 1921.

The White Lake Collieries Ltd. capitalized at $400,000, has been incorporated to open up coal lands situated some fourteen miles north of the town of Keremeos, Nicola-Princeton Coal Field. Mr. Benjamin Barlow has been appointed manager of operations. It is the intention to install the plant necessary to begin and to maintain production on quite a substantial scale.

The provincial government reserve on the coal lands has been removed, an Order-in-Council being passed to this effect in the course of the past few weeks. The withdrawal of restrictions in respect to the staking of coal applies to all parts of British Columbia with the exception of the east coast of Vancouver Island, and the Groundhog and Peace River Districts. The action of the government is not expected to have much effect on the coal situation. The east coast of the Island already is well staked, the Groundhog situated in northwestern British Columbia is without transportation, and the Peace River is similarly placed. The reserve was criticised on the ground that it discouraged prospecting. If its removal to the extent indicated has the effect of stimulating the search for new fields it will, in the opinion of mining men, prove a good thing.

Northern Ontario Letter

THE SILVER MINES.

The Cobalt District.

During the last few days of July the quotations for commercial bar silver showed unusual strength, the price hovering around 62 cents an ounce in New York at the time of writing this summary. Measured in Canadian money, the current quotation amounts to approximately 70 cents an ounce.

Such mines as the McKinley-Darragh, Temiskaming and Beaver Consolidated could be profitably operated under present conditions, having in mind the decline in the cost of material and the higher efficiency of the workmen. The margin of profit, of course, would probably be small and the outlook is that they with remain closed for some time longer, pending a further decline in cost of material and a possible further reduction in wages which would bring the aggregate cost of operation back to not far from the pre-war level.

Each of the closed-down mines having ore reserves and milling plants are being kept pumped out preparatory to resuming work at such time as a reasonable profit is believed to be assured, and under conditions which would offer reasonable hope for continuous operation. Were these properties to re-join those already producing at normal capacity, the industrial outlook in the Cobalt field would be very satisfactory.

The mill of the Mining Corporation of Canada is treating a greater tonnage of ore daily than ever before in its history. The equipment is now adequate to handle approximately 300 tons daily. The ore contains an average of about 20 ounces of silver to the ton, thereby indicating a daily production of approximately 6,000 ounces per day. At the current quotation for silver, the indicated production has a value of around $4,200 daily.

With ore reserves containing an average of upwards of 40 ounces of silver per ton, the Nipissing mine is in a position to realize exceptionally large profit under the favorable conditions which are setting in. The fact that at the Coniagas mine a satisfactory profit is being realized on ore which runs only 10 ounces of silver per ton gives some idea of the favorable position of such mines as have ore averaging over 40 ounces as in the Case of the Nipissing, around 40 or 50 ounces on the O'Brien and about 20 ounces on the Mining Corporation.

The daily press in Ontario is making a fairly general appeal to the directors of mining companies with the object of encouraging each company to issue a brief monthly report to stockholders. It is pointed out that such such a report need not go into detail, but could contain a summary of the amount of underground work done, the result achieved, the tonnage treated and the value produced. It is contended that such a policy would create greater confidence between the public and the mining companies and would encourage capital to engage in the mining industry.

During June, according to a regular monthly statement issued to the Journal by Arthur A. Cole, mining engineer for the T. & N. O. Railway, the mines of the Cobalt district shipped 275 tons of ore to Canadian and United States smelters. The Coniagas was the heaviest shipper with 156 tons, the following being a summary :

Silver Ore.

Cobalt Proper	Tons.
1. Bailey	16.91
2. Coniagas	156.02
3. LaRose	10.95
4. O'Brien	32.00
	275.88

The above shipments were made to the following Companies:—

Canada.

Delora Smelting & Refining Co., Delora	32.00
Coniagas Reduction Co., Thorold	153.17

United States.

American Smelting & Refining Co., Perth Amboy	43.80
Pennsylvania Smelting Co., Carnegie	46.91
	275.88

Price of Silver.

June 20th. Highest	59.875
June 6th. Lowest	57.375
Average	58.510

Elk Lake and Gowganda.

There are good prospects of further exploration and development work being done this Fall in the Cane and Auld township section of the Elk Lake district. The Cane Silver Mines contemplate early activity, while the Ontario Solid Silver Mines may resume work after lying idle for the past five years. The Silver Triangle may also be re-opened, this property formerly being the Kenabeek Consolidated.

The future plans of the Trethewey Company on its Castle property at Gowganda are uncertain, no official statement having been issued since the destruction of the company's mining plant by fire some weeks ago.

The Ontario Government is pushing road work on the highway from Elk Lake to Gowganda, and the throughfare will be suitable for motor traffic this Fall. The attitude of the government toward the newer mining areas has improved, and considerable assistance is now forthcoming. This is in the form of the work on roads such as from Elk Lake to Gowganda, from Boston Creek to Skead township, from Kirkland Lake through Lebel township and from the railway to the centre of activity in the West Shining Tree field.

THE GOLD MINES

The Porcupine District.

The Northern Canada Power Company, in an official interview with the representative of the Journal, assures the mines in the Porcupine district of ample hydro-electric power with which to operate unremittingly and at full capacity. The power company is not apprehensive of any shortage of power, and believe it would be entirely unreasonable to expect a recurrence of the drought which occurred in the last half of 1920. Such a drought must of necessity always be attended with power shortage as no reasonable precaution could cope with it.

An official of the power company told the Journal correspondent that by way of taking all reasonable additional precaution against power shortage, a dam has been put in at Lake Kenogamisse so as to raise the water an additional ten feet. Other storage increases are under consideration and will be proceeded with immediately should the mining companies operating in that field express a desire to go into the situation thoroughly and make known their probable requirements. It is obvious that the power company is anxious to co-operate with the mining companies.

On August 12, the Hollinger Consolidated will disburse a dividend of 1 p.c., amounting to $246,000. This will make a total of $1,968,000 paid so far this year and an aggregate of $15,328,000 to date from the Hollinger. The company continues to treat approximately

3,200 tons of ore daily and the gross yield is at a rate in the neighborhood of $10,000,000 a year.

Reports that the Triplex property had shipped five tons of ore to the Ontario Government testing plant at Cobalt and that the ore averaged around $300 per ton are erroneous. No shipment of ore has so far been made to the plant at Cobalt.

An examination of the new gold find at Bourke's Siding as reported in last week's "Journal" proved the find to be of small importance. The pay-streak appears to be not more than eighteen inches in length and about one inch in width. Samples of the ore are among the richest gold specimens ever taken out of property in this country, but unless further work reveals values over greater length and breadth the new find will not be of any importance other than indicating the possibility of other pockets perhaps of greater size in that vicinity.

Kirkland Lake Field.

On August 10, the Lake Shore will disburse a dividend of 2 p.c. This will call for the distribution of $40,000 and will make a total of $80,000 paid so far this year. Since commencing production March 8, 1918, the Lake Shore has paid $320,000 in dividends in addition to developing the property up to a point where a large mill is warranted. This has been done by operating a mill with only 60 tons daily capacity.

The Queen Lebel Gold Mines is the name of a new company which has been incorporated for the purpose of opening up a group of mining claims lying in the township of Lebel south-east of Gull Lake. The company is capitalized at $2,000,000 and has 160 acres of promising mining land. The work of erecting camps will commence this week.

The annual meeting of the Wright-Hargreaves will be held within the next few weeks. The company started its new mill early last spring and is now producing approximately $2,000 daily. Some important information is expected to be given out at the annual meeting.

A diamond-drilling machine has arrived at Boston Creek and will be used on the Miller Independence mine. Drilling will commence about the end of this week.

Mining Commissioner T. E. Godson, K.C., held his regular monthly sittings, last week in the district of Temiskaming. The list included a total of five mining disputes, two of which were in Timmins and three in Haileybury.

Following is a summary of the disputes:

Timmins Court, July 27.

Donald McCulloch vs Duncan McPhail, this being an appeal from the decision of the mining recorder in respect of mining claims No. P. 8285, P. 8285 and P. 8287.

Terry J. Lyons vs Prosper St. Paul, in connection with a dispute affecting mining claim N. P. 8301, situated in the township of Shaw in the Porcupine Mining Division.

Haileybury Court, July 29.

W. H. Smith vs D. A. McPherson, this being a dispute affecting mining claim No. L. 8200, situated in the township of Lebel in the Larder Lake Mining Division.

Re William Hersee Estate: An application for Vesting Order affecting mining claim No. L. 4681, situated in the township of Lebel, in the Larder Lake Mining Division.

J. Potvin vs H. O'Byrne, this being a dispute affecting mining claim L. 9257 situated in the township of Skead in the Larder Lake Mining Division.

TORONTO MINING QUOTATIONS.

Quotations on Active Stock on Standard Stock Exchange on August 3, 1921.

Silver.	Ask.	Bid.
Adanac Silver Mines, Ltd.	1 1/8	1
Beaver Consolidated		26 1/2
Coniagas	1.65	
Crown Reserve	12	9
La Rose	20	18
McKin. Dar.-Savage	19	10
Mining Corp. of Can.	1.16	
Temiskaming		23
Trethewey		13 1/2
Gold.		
Atlas	24	23
Dome Lake	6 1/2	5 1/2
Dome Mines	19.50	19.25
Hollinger Cons.	7.12	7.06
Keora	10 1/4	9 3/4
Kirkland Lake	39	35
Lake Shore M. Ltd.	1.18	1.15
McIntyre	1.95	1.94
Newray Mines, Ltd.	5 3/4	4 1/2
Porcupine Crown		14
Porcupine V. N. T.	17 3/4	17 1/2
Preston East Dome	3	2
Schumacher		19 1/2
Teck-Hughes	14	13 1/4
Thompson Krist	5 1/2	4 1/2
West Dome	7 3/8	7 1/4
Oils.		
Petrol Oil	24	20
Rockwood Oil, Gas.	1 1/2	1
Vacuum G.	5 1/2	5

METAL QUOTATIONS.

Following are the fair average prices for ingot metals (in less than car-loads).

	Cents per lb.	
Montreal.	July 27th.	August 4th.
Copper, electric	17 1/2	17 1/4
Copper, casting	17	17
Tin	34	34
Lead	6 1/2	6 1/4
Zinc	7	7
Aluminum	29	29
Antimony	7 1/2	7
Toronto.	July 27.	August 3rd.
Copper, electric	17 1/4	17
Copper, casting	16 3/4	16 3/4
Tin	37	37
Lead	7	7
Zinc	7	7
Aluminum	28	28
Antimony	9	9

COBALT.

Most of the cobalt used in the United States comes from Canada, where it is produced as a by-product from the silver ores of the Cobalt district. The only producer in the United States in 1920 was the Missouri Cobalt Co. which recovered 102,410 pounds of cobalt oxide and cobalt hydrate from ore mined at Fredericktown Mo. Canadians are interested in this enterprise also. At present there is a poor demand for cobalt, but in 1920 the United States took Canadian cobalt and cobalt compounds valued at $731,277.

THE GOLD PRODUCER AND THE EXCHANGE RATE.

R. E. HORE.

It is reported from Cobalt that gold mining companies operating in the Porcupine district are not very keenly disposed to co-operate with a view toward reducing the rate of exchange. Why should they be expected to be desirous of cutting down their profits? If commodities are falling in value and the value of gold is steadily increasing relatively, the gold producer is surely not going to exert himself to keep up the cost to war-time figures. If the exchange rate rises because of trade conditions and brings a premium to the gold producer, is it likely that the gold producer is going to attempt to keep the exchange rate down? Knowing that a very considerable portion of the profit from gold mining in Canada arises from the fact that there is now and is likely to be for some time a premium on gold, is the producer likely to dissipate his profits in an attempt to keep other industries on a war time basis or to waste money in hauling materials long distances in order to make other enterprises appear to be more economically sound than they really are? Surely this is not the purpose of mining.

The industrial depression that has been for several months worrying the people of Canada and the United States is admittedly largely due to the production during the previous years of materials at too high a cost and in quantities which could not be marketed. Even last Summer there was a serious shortage of men at Ontario gold mines because of the ridiculously high wages which were being paid in many industries in a mad attempt to keep down costs by increasing production at a time when the market would not absorb the output. From the standpoint of the worker the wages did not seem so high because of the high cost of living, but the sales managers have long predicted the crash that must come owing to the rapidly failing market for high-cost goods.

Slowly now, but none the less surely, conditions are righting themselves. Gold, the standard of value, is said to be at a premium, which is only another way of saying in these days that it is still worth par in New York funds while other forms of Canadian money are not. Products other than gold are at a discount, not because of the exchange rate on New York, but because they have been produced at too high a cost for the market.

The lowering of the exchange rate is not the business of the gold producer. Shareholders of gold mining companies would not approve of any action by mine operators which would take part of their profits to help the delay of a return to stable business conditions. The business of the gold producer is to produce now as much as he can and get the highest possible price for his gold. A return to production of commodities at pre-war costs will bring with it an opportunity to increase export trade and restore the trade balance and bring exchange to par; but until that time arrives, which will bring with it lower costs for gold mining, the interest of shareholders in mining companies will demand that the exchange rate be taken full advantage of.

There is one way in which gold producers will always be found ready to co-operate with others in bringing down the exchange rate, and that is in working towards decrease in cost of production. Decreased cost of labor and supplies will bring down the exchange rate and at the same time make for increase in gold production by making it possible to mine ore that is now being left in the mines. Decreasing cost of labor must be accompanied by decreased cost of living, for the miner must have a living wage. Decreasing cost of machinery and supplies will result in larger quantities being used and in the opening up of new mines. If anyone has a plan for bringing about a correction of the exchange rate by hastening the decrease in cost of production, he will find the gold producer very much disposed to co-operate with him.

SUDBURY NOTES.

By D. E. CUSHING.

Sudbury.—The report of A. C. Burrows, of the Mines Department on the Goudreau area, which has just been made public (see this issue), has served to convince prospectors that the reports of rich gold in that area, have a basis in fact, and quite a number are going in to stake as a result.

There was some skepticism over the reports at first as the rich finds reported were all made by trappers who had been working in the area. However the Porter interests took an option on the Murphy claims, and the report of their engineer, C. G. Daimpre, was so favorable, that the geologist quickly followed him in.

T. N. Powell, the staker of the Murray-Mogridge has just came out after staking ten claims, and he said that the reports of spectacular gold finds are not one whit exaggerated. He says that the showings are just as spectacular and sensational as they were at the Croesus and extent over a much greater area.

The Algoma Eastern Railway controls the lands on which the finds have been made so that it is not necessary for a prospector to have a license to stake. The conditions of staking are, however, just the same, as are also the assessment work conditions.

Much interest is being taken in the recent discoveries reported at Crerar on the C. N. R. It is said that the formation there is much the same as at Kirkland Lake. A large number of claims have been staked and the Gold Nugget Mining and Development Co., with headquarters here, has been formed to take over some properties. The company is now making preparations to undertake some work on their claims. The Mine Service Corporation of Sudbury, is also in the same field and it proposes to start sinking on a surface outcrop immediately. It has just made a call on its shareholders, one hundred Sudbury merchants, for the funds necessary to carry on the work.

This new gold camp is about 18 miles northeast of Sudbury, in the townships of Kelly, Davis and Rathbun. The formation is mostly conglomerate schist with intrusions of diabase and porphyry. Quartz veins of varying thickness traverse the schists highly mineralized in places and containing some gold.

Several prospectors are now in the area staking claims, and it is believed that by the Winter there will be much activity. Specimens of ore, brought to Sudbury carry free gold. E. S. Bennet, Orillia a prospector, made the first discovery in the camp. E. J. Townsend, heads the Gold Nugget Co. George E. Charsley is secretary-treasurer.

Railroad statistics show that of the total tonnage carried by Canadian railroads over one third originates from mines. American railroads report that slightly more than one half of their freight was from mines.

THE DIVINING ROD.

Instruments Supposed to be Useful in Discovering Buried Treasures, Mineral Deposits, Deposits of Oil, and Underground Water.

The idea of a "divining rod" or some other instrument that may be used as a means of finding buried treasure, mineral deposits, and underground oil or water is a superstition that continues with marvellous persistence in spite of the lack of tangible results from its employment.

It may be said without qualification or exception that no rod or instrument has yet been devised to find buried treasures, nor any instrument that will indicate the presence of gold, silver, copper, lead, zinc, or other nonmagnetic metals, or their ores, that are hidden from view under ground.

Iron, nickel, and some minerals that contain these metals are magnetic, and the dip-needle or miner's compass has been adapted to use in prospecting for these metals. Such an instrument can be purchased, but special training is required to enable anyone to use it successfully. A volume published by the United States Geological Survey Department of the Interior, entitled "Mineral Resources of the United States, calendar year 1911," Part I, pages 144 to 154, contains a discussion of methods of prospecting for iron ore by magnetic surveys and by drills. Although the use of the dip needle is theoretically simple, much practice is required to make accurate observations with it, and after these are made they must be interpreted by the consideration of many factors, so that the unskilled user is likely to be disappointed in his results. The edition of the volume above mentioned available for free distribution is now out of stock at the Geological Survey, but a copy may be purchased from the Superintendent of Documents, Washington, D.C., for 90 cents.

Gold, silver, copper, lead, and zinc are not magnetic, and no instrument now in use will indicate the presence of these metals or their ores if they are hidden from view within the ground. Devices that are supposed to indicate the presence of concealed nonmagnetic ore are usually offered for sale either through ignorance or with intent to defraud. Some honest attempts have been made to prospect for nonmagnetic ores by measuring in different directions the capacity of the ground to conduct an electric current, the idea being that ground containing metallic material will conduct the current better than that which contains none. These attempts, as well as trials with other electrical devices, however, have not been successful, and the various forms of such apparatus could not be used by one unfamiliar with electrical work.

Some measurements of the electric potential of metallic minerals were made several years ago in the laboratory of the United States Geological Survey by R. C. Wells, and the results were published in the Survey's Bulletin 548, entitled "Electric activity in ore deposits," which may be had for 10 cents from the Superintendent of Documents. The results obtained by Mr. Wells, however, do not afford an adequate basis for any method of electrical prospecting, and it is still doubtful whether electrical methods of prospecting for nonmagnetic ores will ever be useful, although they may have limited application in searching for certain kind of ores. Most deposits of the precious and semi-precious metals and their ores are discovered by those who, by experience, have become familiar with the kinds of rock in which the ores are found and who use the ordinary methods of prospecting.

No instrument other than the drill has been devised that will indicate the presence of water or oil underground. In determining the probable existence of underground supplies of these liquids geologists are guided by their knowledge of the relation of beds of rocks visible at the surface to beds that contain oil or water at other places in the same general region. They also make use of the recognized relation of occurrences of oil or water to certain structure (folds, faults, etc.) in the rocks, and of surface indications, such as oil seeps, springs, outflow of gas, etc. The United Geological Survey has published as Water-Supply Paper 416 a report by A. J. Ellis, entitled "The divining rod, a history of water witching," which shows the uselessness of the instrument. This report may be obtained of the United States Geological Survey, Washington, D.C.

THE WORLD'S COAL PRODUCTION.

Reports received by the U.S. Geological Survey show that the world's coal production in 1920 was 1,300,000,000 tons. The production in 1919 was 1,158,000,000 which was less than that of any of the eight preceding years. The United States production in 1920 was about 645,663,000 tons as compared with 546,155,000 tons in 1919. The short production in 1919 resulted in the general alarm in 1920 and the consequent high prices and comparatively poor quality of coal produced. The 1920 production was about normal in quantity, but was produced at high cost and sold at very high prices.

TORONTO COAL PRICES.

Toronto, 3rd August.—The price of slack coal is still stiffening up. It is now anywhere from $1.75 to $2.00 a ton, with the prospect of a further advance. In spite of the stiffening in price, however, buyers are not coming forward in any great volume. Lump coal continues at the same price—about $2.60 to $2.90 a ton—but the demand for it is weak. Anthracite of all kinds advanced 10c a ton on the 1st of this month. That is the usual practice at this time of year—to advance the price of anthracite coal 10c a month for five months from August, so that, other things being equal to the person who buys coal in July gets it at 50c a ton cheaper than the person who buys it in December. The public are still holding off from buying their winter coal believing apparently that a drop in prices will not be long delayed though this the dealers emphatically deny.

TAXABLE SURPLUSES OF MINING COMPANIES IN ONTARIO.

In view of that fact that the annual earnings and the dividends paid by mining companies include return of capital as well as profits, the reported earnings of a mining company and its distributed earnings do not properly represent the earnings and dividends that should be taxed. It is common practice in Ontario to assume that one half the earnings should be applied to reduction of capital, and as such should not be taxed. The operation of a mine must result in removal of the ore and those who are taxed on reported earnings or dividends will do well to inform tax-gatherers as to the nature of the mining business.

In the case of the Dome Mines, Mr. Alex. Fasken, the secretary of the company, has advised shareholders resident in the United States to take note that it is the practice in Ontario to allow one half the net operating profits of a gold mine to be applied to ore depletion and only one half is considered as accessible for income tax.—R. E. H.

THE SYLVANITE MINE—KIRKLAND LAKE.

The completion of arrangements for financing development of the Sylvanite property will doubtless be soon followed by active operations there. The Sylvanite is very favorably located between the Wright and the Tough-Oakes mines, and exploration will very likely result in much ore being found. The property has been for some time idle; but the reported arrangements indicate that a satisfactory basis has been found for the resumption of work. English and American interests will jointly finance and control the operations.

With the Sylvanite operating, the main ore belt at Kirkland Lake will be under development at six mines, Tough-Oakes, Sylvanite, Wright-Hargreaves, Lake-Shore, Teck-Hughes and Kirkland Lake Gold Mines. The latter four are producers and Tough Oakes is equipped with a first class mill.

In view of the fact that the Sylvanite is largely owned by people interested in the Tough-Oakes or Wright-Hargreaves, development of the Sylvanite is likely to proceed rapidly now that terms have been agreed upon.—R. E. H.

EDITORIAL

THE MACKENZIE OILFIELD.

In this issue appears a partial reprint of a description by E. M. Kindle and T. O. Bosworth of the oil-bearing rocks of the lower valley of the Mackenzie, and, by courtesy of the Director of the Survey, some of the photographs and maps accompanying the description as it appeared in the Summary Report of the Survey for 1920. The actual finding of oil, in quantity estimated as being a thousand barrels a day, and flowing under fair pressure, rewarded the geologists of the Imperial Oil Company when a demonstration borehole was put down at a spot not selected with the hope of great production, but because it afforded the most easily accessible location where a hole of moderate depth "could not fail to penetrate the petroliferous formations", and that within the limited time available for drilling. This substantial achievement, following years of work, based on geological reasoning, and indicating the probable existence of a Paleozoic oilfield of continental extent in a remote and inhospitable land, immediately aroused intense interest in Canada. For one reason, the search for oil and its discovery at Fort Norman, brought to public realisation in Canada that the days of great adventure, our "heroic age" as it has been called, are not yet passed. Had a novelist, seven years ago say, described the flight of an all-metal airplane for the cities of Alberta to a flowing oil-well at Norman, vision would have seemed wild and incredible. Yet seven years ago the airplane was a practical invention and the records of the Geological Survey, in numerous places, suggested the presence of oil in the North. A second reason for public interest is the significantly wide appreciation of the value of oil, which is a reflex of an unremitting and slightly hysterical propaganda that for three years has filled the newspaper columns and given the average newspaper reader a viewpoint on the importance of oil that is anything but judicial or correct.

In view of the undoubted importance of the Mackenzie Valley "where the conditions conducive to the formation of oilfields are very favorably fulfilled", the unusual space devoted to Messrs. Kindle and Bosworth's description in this issue is justified by the very general interest taken in this territory.

NORTHEAST LABRADOR AND NEW QUEBEC.

Dr. A. P. Coleman's memoir on the northeastern peninsula of Labrador, between Ungava Bay and the North Atlantic, is a description in accordance with the best traditions of the Geological Survey. It is a note of observations in the country that Dr. Grenfell has made familiar to the public, and is written in a style that combines erudition and the most competent kind of recorded observation with such clearness of diction that the account is readable with profit and pleasure by all.

Dr. Coleman writes of cataracts "falling 1,000 or even 2,000 feet," and of Nachvak Fiord, a typical trough, over 30 miles long, with a depth of water of 110 fathoms, and with walls rising to 4,000 feet in height. The climate is chill and dreary in Summer and extremely rigorous in Winter. Agriculture is impossible, and apart from the fisheries, which are prosecuted on the Labrador coast by Newfoundland fishermen, mining would be the only industry that could attract a population.

Labradorite, a most beautiful stone, is found plentifully, but "in many places it has little of none of that schillerization or chatoyancy which makes it valuable." It is suggested that if got out unfractured on a large scale, so as to be sawn into slabs, schillerized labradorite "should make one of the most beautiful decorative stones imaginable." Metallic minerals believed to be present include copper, iron ore, and pyrite, the last named being common. Graphite is present, but whether in workable quantities is unknown.

Dr. Coleman's general conclusions from the little that is known of the economic geology of the region are so suggestive that they are quoted in full, as follows:

"From the foregoing brief account of the known economic minerals of Labrador it will be inferred that no deposits of great value have yet been found;

but, on the other hand, very little search has been made for them and the slight attempts at prospecting have been made only at or near the coast and usually by inexperienced persons.

The interior has not been touched by geologists or prospectors except at a few points along a band indicated on the latest geological map as 'Keweenawan, Animikie, etc.,' where Low has proved that iron ores exist. The band runs parallel to the coast, as mapped, but is more than 200 miles inland; and north of latitude 55 degrees nothing is known by direct observation of the intervening country. It has been shown in earlier parts of this report that large areas of the Grenville-like rocks extend inland at Komaktorvik and Nachvak bays; that green schists like those of the Keewatin occur, and that probably Keewatin iron formation exists somewhere inland; that rocks resembling the Sudbury or Timiskaming series, the Huronian, and the Animikie and Keweenawan cover large areas; and that in many places basic and acid eruptives cut the older formations as dykes or form sheets among the sediments of the later Precambrian series. So far as can be seen the conditions are similar to those which have caused the economic deposits of the Grenville, Timiskaming, Huronion, Animikie, and Keweenawan series of Ontario and Quebec; deposits which have made Ontario one of the great mining regions of the world.

It is evident that the almost unknown interior of Labrador includes not alone barren granite gneisses, as commonly supposed, but probably also equal areas of other Precambrian rocks of much greater economic promise. It is a region that deserves closer study than it has yet received, and its very bareness and lack of vegetation facilitate such an examination as compared with regions largely hidden under drift or covered with forest.''

PRECIOUS METALS REPORTED IN PATRICIA, ONTARIO.

Reports have reached Toronto of claims being staked in Patricia district for gold, silver and platinum. The discoveries have been made in an area about twenty-five miles north of the English river and ten miles east of the Manitoba boundary. This is the south west corner of the new district of Patricia which forms the north eastern part of the Province of Ontario. The recording office for the mining division in which the discoveries have been made will be Kenora.

No detailed report of the discoveries has yet reached the Department of Mines. The prospectors report that the rock formations are similar to those at Cobalt. No samples of ore have come in however, and it is not known yet whether the chief values are in gold or silver. The probabilities are that the gold-bearing formations are more prominent in this part of Ontario than the silver-bearing rocks and reports of gold discoveries have been expected to result from prospecting in the area.

The available information indicates that the scene of the new discoveries is almost directly east of the Rice Lake gold area and north of Kenora. It is a part of Ontario that is considered to be a very likely place for the occurrence of gold deposits.

Some account of the geological features of the south western part of Patricia is to be found in the 1920 report of the Ontario Department of Mines. Mr. E. M. Burwash spent the field season of 1919 along a part of the sixth meridian and in the vicinity of Wessasaga, Birch Lake and Trout Lake Rivers and his report to the Department gives the results of his reconnaissance survey. Mr. Burwash is at present working further north.—R. E. H.

TORONTO GETS NOVA SCOTIA COAL BY WATER ROUTE.

One of the Dominion Steel Corporation's freighters arrived in Toronto on August 4th with 2,200 tons of coal direct from Sydney, Nova Scotia. One thousand tons of the original cargo had been discharged in Montreal on the upward journey to lighten the vessel sufficiently to go through the 14 ft. locks above Montreal. The vessel will load wheat at Port Colborne for discharging at Montreal on her return trip. While costs may be calculated on paper, and the feasibility of routes and cargoes decided by discussion, there is no exact way of finding out the advantages or disadvantages of a transportation route except to try it out. The Dominion Company has recently done two significant things. It has sent coal to Cochrane, Ont., by water from Sydney to Quebec and by rail from Quebec to Cochrane; and it has sent coal by water to Toronto. Both routes are logical and natural extensions of the St. Lawrence waterway, and the achievement in each instance is a challenge of a general and too easily accepted belief regarding the St. Lawrence route, namely, that so far as Canada west of Montreal is concerned, the St. Lawrence is all right to send freight east, but it is no good to take freight west. It is heartening to see someone try.

U.S. NICKEL IMPORTS AND EXPORTS.

The U.S. Geological Survey reports that nickel ore and matte amounting to 36,568 tons and containing 41,586,108 lb. nickel were imported into the United States during 1920. Of this small quantities came from Austria, Belgium and French Oceania and the greater part 33,182 tons containing 37,737,459 lb. nickel and valued at $7,723,278 came from Canada. Canada also sent to the United States manufactures of nickel valued at $2,179,494. The exports of nickel from the United States in 1920 were only 1,215,232 lb. as compared with 33,404,011 lb. in 1916 and 29,173,088 in the last pre-war year 1913.

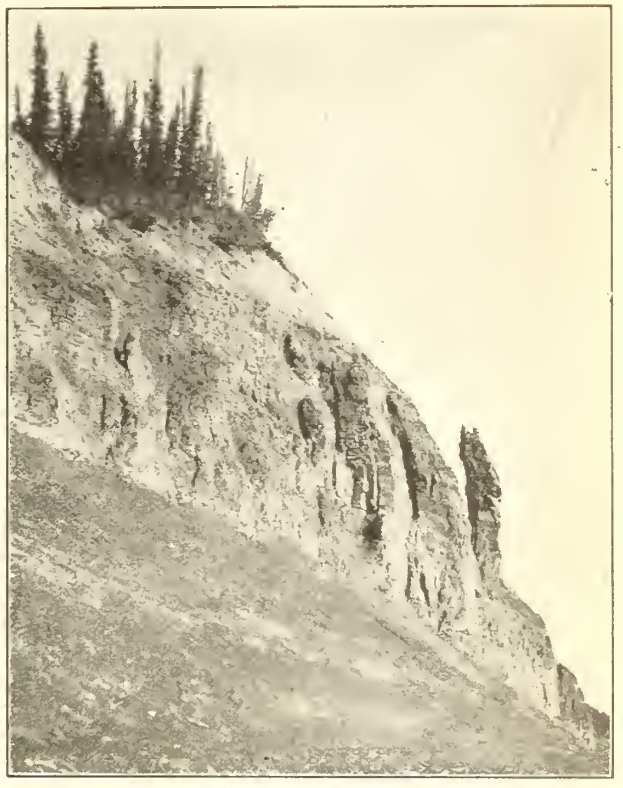
Mr. David Rorison has been appointed manager of the newly opened coal-mine at Whiteside, near St. Peter's in Richmond County, Cape Breton, and has removed to St. Peter's from Stellarton, N.S.

	Certain beds have an abundance of crinoid stems	30±
h.	Grey, hard limestone mostly in 6-inch to strata. Stromatoporoids abundant, other corals much more varied and abundant than in g. Rensselaeria and Stringocephalus also common	95
i.	Bluish grey calcareous shale in strata mostly 1 inch to 3 inches thick with *Chonetes* and *Martinia* abundant	95
	Beds in upper 2 miles dip up stream at about 1 degree; the fall of the river makes them rise in the cliffs in descending the gorge rather rapidly, however.	
	All of the limestone beds in the Ramparts are quite free from small low folds or domes such as those seen on Athabaska river.	

A more typical example of a disconformity than the contact between the middle Devonian limestone and the Cretaceous at the head of the Ramparts would be difficult to find. Not only are three geological systems—the Jurassic, Triassic, and Carboniferous—missing but all of the Upper Devonian as well are absent from the section. The absence of the Devonian formations of later age is probably due to their erosion. The highly irregular surface of the top of the Ramparts limestone furnishes unmistakable evidence of the down-cutting of the limestone surface previous to Cretaceous sedimentation. Erosion in pre-Cretaceous times has in places cut out the whole of the Devonian limestone series. A section of the west bank of the Mackenzie, about 10 miles northwest of Good Hope, shows the Cretaceous shale and sandstone resting directly on the Hare Indian River shale, while the Ramparts limestone has on either side of this section its ordinary development except that it is thinner than in the Ramparts. The presence of the Upper Devonian shale in the sections both north and south of the Ramparts region indicates that its absence at the Ramparts is due to erosion.

The Ramparts limestone forms a scarp along the sides of the valley for several miles north of Good Hope. South of the Ramparts it has been recognized by its characteristic fossil—*Stringocephalus burtoni*—in the Bat hills and Carcajou mountain.

Beavertail Limestone. The thickness of this series is 300-400 feet. The strata consist of hard, thick and



A. Fort Creek shale at the mouth of Fort Creek, Mackenzie river. (Photo by E. M. Kindle.)

thin-bedded, bituminous limestones, with some shaly partings. They are so highly bituminous that their colour generally is almost black.

These rocks contain few fossils; but at the top there is a coralline bed which frequently forms dip-slopes. Its surface weathers grey, but where newly fractured it is seen to consist of grey corallites set in a black bituminous matrix.

A gradual transition upward from the Beavertail limestones into the Fort Creek shales, is well seen in the extensive cliff exposures along the south flank of the Wolverine anticline.

The Beavertail limestones, being considerably more resistant than the overlying formations, form the slopes of the ridges which mark the trend of each of the main anticlinal folds. They are conspicuously exposed in many places between Norman and the Ramparts.

B. Beavertail limestone on west side of Carcajou Mountain anticline, arching down on bank of Mackenzie river. (Photo by T. O. Bosworth.)

On the banks of the Mackenzie they are well seen at Carcajou rock (Plate V B), East mountain, and Beavertail point; they are fully exposed on the hills, and up the creeks entering the Mackenize between Bear mountain and Carcajou.

The character of the upper part of this limestone and its relation to the next higher formation are shown in the following section taken near the northern end of the riverside exposures at Carcajou mountain.

Carcajou Mountain Section.

	Feet
a. Fissile black shale with interbedded bituminous limestone becoming more calcareous in upper 16 feet and splitting into sheets of bluish-black, bituminous limestone	65+
b. Grey limestone	5
c. Fissile black shale	1
d. Dark magnesian limestone of saccharoidal texture and bituminous odour	4
e. Hard, dark blue limestone with one or two thin bands of black slate in lower half	55

This section shows plainly the intergrading of the Beavertail limestone with the black shale of the Fort Creek shales. The beds to the east are considered to represent the upper part of this formation. About one mile up the river from the section, where the limestones stand vertical, about 260 feet of limestone is exposed. *Stringocephalus burtoni* occurs abundantly in the innermost or lowermost 60 feet of these rocks thus indicating the identity of a part or the whole of the limestones on the river bank at this point with the Ramparts series, which forms the base of the Beavertail limestone.

Fort Creek Shale. This series has a thickness varying from 500 to 1,000 feet, of which large parts are fully exposed in many places.

The strata are of very dark colour, often almost black. They consist chiefly of bituminous clay-shale, with thin seams of black limestone and calcareous sandstone. In some of the shales large plants are present, and the limestone bands contain some *Leiorhynchoids*, *Chonetes*, *Productella*, and other fossils.

These bituminous beds are seen throughout a considerable extent of the country between Norman and the northern limit of the map. They are exposed on the flanks of all the anticlines outcropping on the banks of the Mackenzie near Bear mountain, Carcajou rock, East mountain, and also in many tributary creeks.

About the latitude of the Arctic circle, and from thence northward, they occupy a large area, lying almost horizontal. Near the site of old Fort Good Hope they are much exposed to the river cliffs, and in Fort creek and elsewhere.

These shales are so bituminous that their odour is perceptible at a distance. In many places they are undergoing slow combustion and are burnt to a bright brick-red colour.

By weathering, the cliffs of Fort Creek shales are often coated with sulphur, and there are many sulphur springs in the areas underlain by them.

The main oil horizon was encountered in the Discovery oil well, at 783 feet. It is believed to lie in the middle or lower portion of this series.

The following section taken at the type locality of these shales shows the upper part of the formation:

Fort Creek Section.

	Feet
a. Black, bituminous, fissle shale with occasional ⅛ inch of cherty material. *Styliolina*, *Conadonts*, and plant fragments.	120=
b. Black, bituminous sandy slate or slaty sandstone. Sand grains very fine: strong bituminous odour. Splitting freely into large even sheets. Fossil plants common, one 6 inches in diameter (Pseudobornia?) also a few Tentaculites	15
c. Black, bituminous sandstone similar to above but without the slaty cleavage and in beds 8 inches or 10 inches thick	5
d. Drab, argillaceous, soft shale with *Leiorhynchus sp. Productella* (large) *Chonetes* et cetera?	35
(Lower part covered).	

The base of a series of black shales considered to represent this formation is exposed on the northwest side of Bear mountain near the base in the bed of a small brook which heads on the mountain. Fissile black shale 50 feet thick rests on grey limestone, showing an abrupt transition, in sharp contrast with the transition seen in the Carcajou Mountain section.

Bosworth Sandstone and Shale. This important formation has a thickness probably exceeding 2,000 feet, though only the lower 1,000 feet have been found exposed.

The formation consists chiefly of grey-green clay-shales, sand-shales, and sandstones, with other varicoloured strata. Some beds contain marine fossils such as *Atrypa reticularis* and *Accervularia*, in others there are plant fragments and carbonaceous matter.

The basal part, to the extent of some 200 feet, is largely of sandstone beds, and at other horizons also

B. East Mountain anticline. View from the summit facing eastward along the axis of the fold. The ridge in the middle is an arch of limestone, the anticlinal axis trending from background toward the observer and pitching down in the foreground. (Photo by T. O. Bosworth.)

prominent green sandstones occur. At outcrops the sandstones give rise to seepages of oil.

On drilling into the outcropping Bosworth beds, small yields of oil were immediately procured.

These beds occur in the country north of Norman, occupying the synclines or lying low down on the flanks of the antielinal folds.

The best sections are found in a number of creeks which enter the Long Reach of Mackenzie river from the northeast, in the 100 miles between Bear mountain and Carcajou rock.

Along the river side also, between these points, there are several small outcrops of the sandstones, causing seepages of oil. But the only large exposure on the banks of the Mackenzie is on the south flank of the Wolverine anticline, where a few hundred feet of these beds are seen just before the river turns westward, a few miles southeast of Carcajou rock.

The character of the beds exposed here is indicated in the following section:

Carcajou Mountain Section.

	Feet
a. Hard, thin-bedded, grey siliceous limestone weathering brown, with numerous plant fragments, also some invertebrate fossils	5
b. Dark shale and covered	65±
c. Dark, lead-grey shale with much disseminated decomposing Fe, S and Yellow sulphur-stained beds	150±
d. Thin-bedded, irregular, current marked sandstone	5
e. Duplicate of c	75
f. Sandy shale and thin-bedded sandstone with few rounded pebbles in upper beds 4 inches to 8 inches in diameter. Worm trails common	6
g. Dark shale with sandy bands	25
h. Hard, buff, thin-bedded, ripple-marked sandstone	15
i. Dark bluish shale	35
j. Buff sandstone	6
k. Shale and thin-bedded sandstone	75
l. Hard, bluish-grey shale	60
m. Fissile dark shale	100
n. Sandy, bluish-grey shale	150+

Age and Correlation.

A discussion of the geological age and the correlation of the formations which are recognized and described here will be presented elsewhere.

The table given in the first part of this section indicates the correlation of the formations of this region with those of other parts of the Mackenzie basin. The palaeontological evidence on which the table is based, will be presented in later papers.

It may be noted that although the region included in the maps has furnished no fossils from the formation forming the base of the section and here referred to the Silurian, an unmistakable Silurian fauna has been found by one of the authors in the Mount Charles section on Great Bear river, and in the Cap Mountain section, east of Wrigley. Such characteristic Silurian species as *Halysites catenulatus* and *Conchedium* sp. are present in these sections in dolomites which almost certainly represent the formation here called the Lone Mountain dolomite.

The youngest of the Palaeozoic faunas in the section, the Fort Creek shales, has some interesting features among which are a *Pseudobornia* (?) resembling one in the Huron shale of the Ohio Devonian. A conodont fauna was also discovered in this shale—the first which has been found in northwestern Canada.

A large proportion of the faunas of the several formations are new and the discussion of their relation and characteristics must be deferred to a later paper.

Geological Structure.

The Devonian rocks exposed in the Mackenzie valley are part of a great sheet of marine sediments which were laid over much of the northwest quarter of North America.

The original shore-line of these deposits are, as yet, matter for conjecture and the mapping of the boundaries of the preserved portion of the resulting formations is far from complete.

The broader features of the structures developed in these formations by mountain-building forces will be outlined so far as they have been worked out.

Structure Between Norman and the Ramparts.

Twelve miles before reaching Norman, the Mackenzie turns sharply northwestward, flowing along the south flank of Discovery range. This straight course known as the Long Reach, is maintained for 75 miles, parallel with the range, and several miles distant to the southwest of it. The river then turns sharply northward and in a distance of 25 miles it cuts across the trend of the mountains at their western end.

In this 100 miles of the Mackenzie valley, the Devonian formations are much exposed, and mountain-building folds which will now be described are revealed.

Anticlinal structure in this region was noticed first at Bear mountain by McConnell, in 1888. The other folds were found and mapped by T. O. Bosworth in 1914. It was in this territory that the favourable indications and structural conditions were found which have led to the recent strike of oil.

A. View of the northern scarp of the Bat Hills anticline, looking northwest from the southern scarp. Mackenzie river in the background. (Photo by Imperial Oil Co.)

Before a complete account of the tectonics can be written, much further geological work is necessary. The following represents but an imperfect preliminary impression.

The Devonian beds of the Discovery Range district have been thrown into a series of bold unsymmetrical folds, whose axes plunge up and down, steeply and frequently.

In the synclinals, the soft Bosworth sandstone and shale beds and Fort Creek shales, together with the overlying Cretaceous deposits, give rise to flat, low ground. But wherever the upward pitchings of the axes bring the arches of the Beavertain and lower limestones up above the general level of the land denudation has developed these arches as conspicuous anticlinal mountains.

In the area where the Mackenzie crosses the folds, there are four main anticlines, all pitching downward to the west. In order from south to north they have been named:

Wolverine Anticline.
East Mountain anticline.
Bat Hills anticline.
Beavertail anticline.

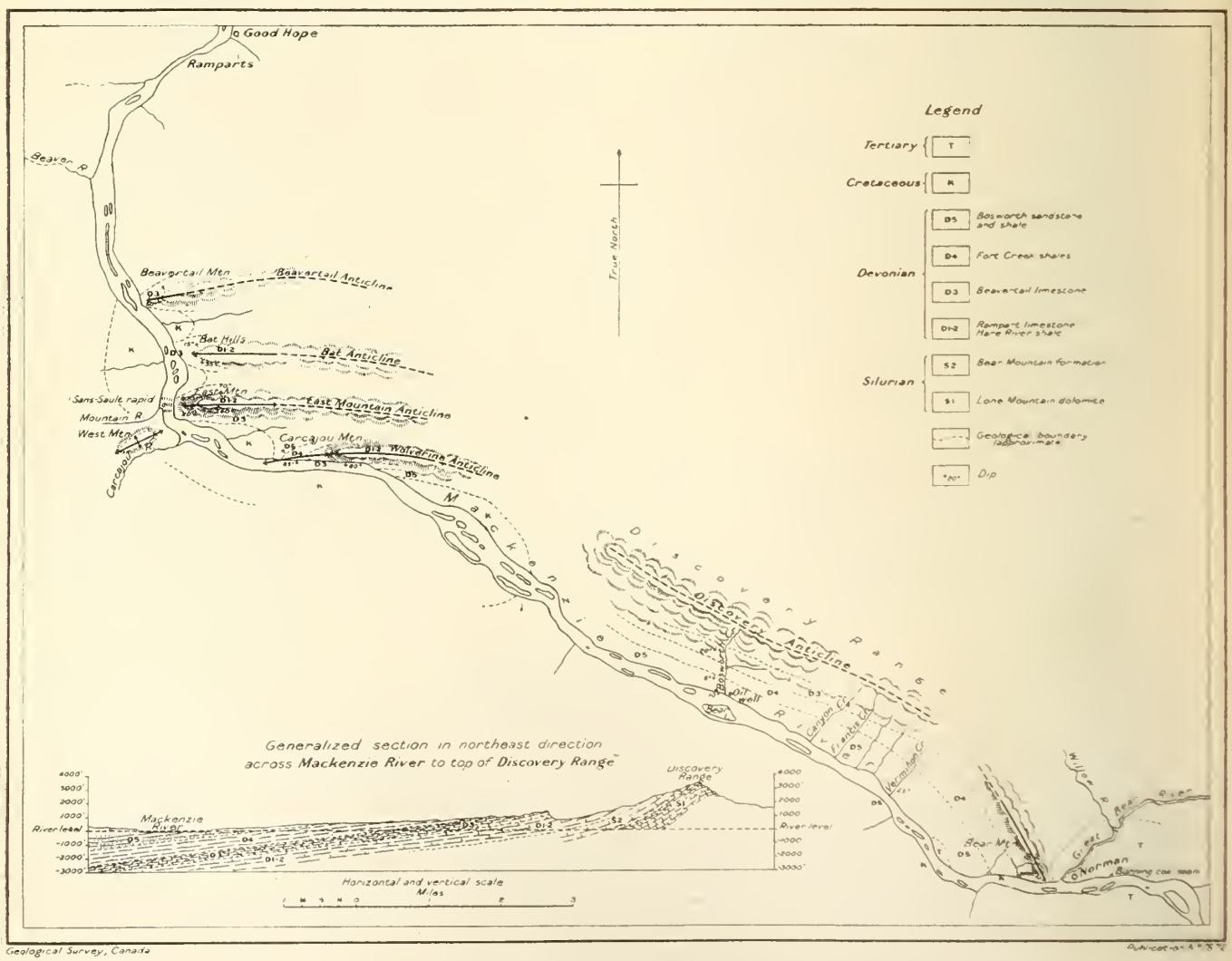
The wave-length of the folds, from crest to crest, are about 7 miles. The amplitude from crest to trough must be of the order of 5,000 to 10,000 feet.

The four folds are approximately parallel. Where the river crosses them, their trend is a few degrees north of east, but east of the river they bend round to the southeast course, which is probably their more important direction.

Far back from the river little exploration has yet been done, and it is not known whether all of the four anticlines are continuous. In the district where their direction crosses the river, it is seen that, owing to their pitching up and down, they tend to cause four ranges of rather discontinuous hills.

Wolverine Anticline. The southern-most of the four anticlines was examined with the most care. It is thought that this axis of folding is continuous from Bear mountan (near Norman) to Carcajou mountain, with a length of about 100 miles. Throughout the greater part of this length, the axis lies 8 miles inland, parallel with the river: but a turn in its direction, at each end, brings it to the river bank.

At Bear mountan which has a height of 1,500 feet, the folding is complicated by faulting and is not yet fully mapped. The core of the arch consists of the limestones with reddish shales and gypsum shown in the section page 45 to which the name Bear Mountain formation is applied. On the west flank, the bituminous Beavertail limestone and Fort Creek shales are exposed.



Sketch map showing approximate geological structure of the Norman-Good Hope area, Mackenzie River, Provisional District of Mackenzie

To accompany Report by E. M. Kindle and T. O. Bosworth, on Summary Report, Part B, 1920

Scale of Miles

Geology by T. O. Bosworth, 1914, and E. M. Kindle, 1920
Formation boundaries approximate

The data available do not admit of any reliable estimate of the well's capacity. It seems likely that the yield may be nearly 1,000 barrels a day. Increased production may be obtained when the well is deepened. It is considered that the Beavertail limestones have not been reached.

Whether the first well will yield a steady production or not is at present quite uncertain: but it has already demonstrated the prospect of important oil fields in the region.

The crude oil from the well is of light colour, low specific gravity, high gasolene content, and low cold test.

An analysis made at the Alberta University (J. A. Kelso), has been quoted as follows:

Specific gravity		0.845 (36° Beaume)
Distillation	70°-150° C.	22.5 per cent.
	150°-300° C.	38.5 "
	300°-350° C.	33.9 "
	350°-375° C.	4.1 "
	Loss	1.0 "

Thus in commercial terms the oil consists of—

Gasolene	22.5 per cent.
Illuminating oil	38.5 "
Light lubricants	33.9 "
Medium lubricants	4.1 "

The seepage oil obtained by digging is of greenish black colour having specific gravity "905 and paraffin base."

The present oil-well is situated far down the flank of an anticline 100 miles in length: and the whole 783 feet of strata penetrated by the drill are petroliferous.

North and east of this anticline other similar anticlinal hills occur, and in the flat ground to the west and north there may be the continuations of these anticlines (and possibly other anticlines besides), their limestone arches being below the general level of the land.

The sum of the geological evidence, together with the result of the test well, indicates an extensive oil region in which a number of oil fields may occur.

The capacity of the wells and the productivity of the fields, are matters beyond present calculation. But they are likely to be comparable to those of other Palaeozoic oil fields.

SUDBURY NOTES.

D. E. Cushing.

Sudbury. — Interest is centred on the reported find of lead on the property of the Gold Nugget Company, a Sudbury organization, made at Crerar on the C. N. R. Samples brought out have brought some favorable comment from mining engineers who examined them. An assay of some of the samples showed a content of 78.10 per cent. This is said to be the highest percentage obtained in any lead find in the North. One made at Sturgeon Falls some years ago ran 25 percent. The assay of the Gold Nugget Co., showed $8 gold value and 20.50 ounces of silver. It is not known whether the assay was from systematic sampling or a picked sample. There is an eight inch galena vein showing on surface, which has been traced 126 feet.

It is reported that another gold strike of importance has been made west of here, at Patricia, north of Kenora. No details of the strike have been given out, but it is understood that a number of prospectors have gone into the field.

Considerable staking is still going on int the Goudreau area. However, the report of rich narrow patches of gold, are such that it will be necessary for some real mining to be done to show that the values of the area are consistent and the ore bodies of some size, before real mining interest will be centred on the area. Values given so far have been of the most spectacular nature, and this fact alone makes the real mining men somewhat skeptical about the camp.

The International Nickel Co. has recently further curtailed operations and it can just be said that the company is operating and that is all. Wages has undergone another fifteen percent cut throughout the whole enterprise and besides many more employees, including some of the veterans, have been let out. The report on operations for the second quarter of this year, shows that the profit on common stock was two cents a share as compared with 75 cents for the same period of last year. The net profit was $179,402. In the same period last year the profits were $1,402,069. The general balance sheet as of June 30, shows a profit and loss surplus of $11,931,890 as compared with $11,659,612 in 1920. Cash on hand this year totals $1,210,260, compared with $4,173,492 and inventory stands at $12,213,948 as against $8,301,832.

METAL PRODUCERS' PLIGHT.

ALEXANDER GRAY, Montreal.

The International Nickel Company barely earned its preferred dividend in the quarter ended June 30. The margin of two cents applicable upon the common stock does not suggest the advisability of surtaxing mineral industries in general gold mines alone are benefitting from current operations. Only four Cobalt companies are active—and they are exceptionally placed. Certainly none of the nickel producers are finding responsive markets — and at least one substantial lot of the refined metal cannot be liquidated.

Otherwise in excellent shape, equipped as it never was for greater outputting, prepared to meet the terms imposed by any market, the International company cannot disassociate itself from universal stagnation. Spot copper at 11½c.—and not a great deal of it going at that price — futures about the low level of March 11th—which was 11 3/4c.—bulk copper held at 12 1/2c. for export—indicates a salvage situation that is not at all agreeable. Only Japan and Germany are in the metal market while other nations are debating reparation and disarmament issues—but even those countries do not seem to want much if any nickel.

Large copper producers will not force the sale of their metal. They cannot produce copper for the price current. No important domestic business is forthcoming — consumers are pursuing a hand-to-mouth policy. Consequently there is no remunerative incentive for production-nickel for the time being is on the waiting list, neither useful nor ornamental.

Trade depression, costs plus taxation, hardly suggest more taxation as a stimulant. The International Nickel corporation is fortunate is having a strong treasury, great reserves of high grade ore, and more of lower grade, besides new and enlarged plants without fixed charges to speak of—but it cannot do the impossible when the world is flouting metals of all kinds.

PERSONAL.

Captain James G. Ross, Consulting Mining Engineer, with the Milton Hersey Company Limited, Montreal, has returned from an extended examination trip to the Northern interior of Quebec.

British Columbia Letter

The Chief Inspector of Mines, British Columbia, has issued a pamphlet on the grades of coal available to the domestic trade of the Province. He shows how each is prepared and for what purpose each is best suited. Six grades are dealt with, namely, "lump or scow run", double-screened lump, nut coal, pea coal, slack coal, and screenings. The former is the product screened over a 1½ inch to 2 inch screen at the mine and "is the coal sold to dealers for distribution in Vancouver and Victoria for domestic use." This, it is gathered, is more economical to the consumer for the reason that it "receives no treatment at the hands of the coal dealers. The scow is loaded with high grade lump at the colliery bunkers, which product is taken direct by the dealers to the consumers' bins after sacking. "Double-screened is that which is re-screened at the dealers' sheds, and being sold in large pieces is especially suitable for open fireplaces. Nut coal is the product that passes through a 1½ inch to 2 inch screen and over a ¾ inch screen. It is washed to take away the impurities and is specially adapted to stoves and heating plants. Pea coal is that which passes through a ¾ inch screen and over a ⅜ inch screen. It also is washed to take away impurities and can be used in stoves and heating plants with narrow openings in the grate-bars to prevent it falling through. Slack coal is that which goes through a ⅜ inch screen which, being washed to do away with impurities, is used for firing boilers and at powder fuel plants, cement plants, green houses, etc. As to "screenings" it is described as being the residue from the re-screening of the coal at the dealers' sheds and is adapted for use in greenhouses, heating plants, etc. Attention is particularly called to the necessity, wherever possible, of 'laying in' the winter supply of coal during the summer, thus eliminating danger of a shortage. "For lack of a market during the summer months" it is stated "the mines have worked only part time which adds materially to the overhead expense of coal mining."

Six of the latest type of Paul Breathing Apparatus have been purchased by the British Columbia Department of Mines for the Cumberland (V.I.) Mine Rescue Station. This is one of the coal mine centres of the Canadian Collieries (D) Ltd.

Victoria, B. C.

George H. Kilbourne, of the Canadian Consolidated Mining & Smelting Co., is reported to be making satisfactory progress in the mineral survey of the E. & N. Land Belt, Vancouver Island, of which work he has charge. He has two parties in the field and the ground is being very thoroughly covered. It is being taken up systematically, section by section. Rivers and their tributaries are being traced to their source. The flowing waters are watched for float and the geological conditions studied. There is a possibility that this scientific prospecting will pass by mineral deposits of merit but it is felt that nothing really big will be overlooked. When the reports of Mr. Kilbourne and his fellow engineers finally are submitted the Canadian Pacific Railway Co. will be in a position to resume negotiations with the Provincial Government with a view to placing the administration of the minerals of the Belt under the sole jurisdiction of the Province.

Mr. Normal Carmichael general manager of the Arizona Copper Co., is visiting his brother Mr. A. Carmichael, of this city. Mr. Carmichael is closely related to Mr. Herbert Carmichael well known for many years as British Columbia's official Assayer and now prominently identified with the mining industry. He formerly was manager of the Granite Mine, near Nelson, B.C., and of the Highland Mine, Ainsworth.

Herbert Addison, vice-president of the Big Horn Collieries Company, of Denver, Colo., has been sojourning in Victoria on his summer vacation. He reports that the coal mining business, both as to production and to market, is fairly satisfactory. The smelter trade, of course, has fallen off because of the lack of activity among the copper smelters.

Prince Rupert, B. C.

James O. Greenan, engineer with the Yukon Gold Corporation at Mayo, is quoted as stating that sufficient work has been done in the Keno Hill Section of Mayo District to assure the production of high grade ore for several years. Nothing, however, has been uncovered to warrant the prediction that such ore will be available in quantity for a longer period. The Yukon Gold Corporation has done several thousand feet of development work and is proceeding as fast with these operations as its facilities permit. Twenty-five hundred tons of high grade ore have been shipped this year by the Corporation. Shipments are being made via St. Michael to the Shelby Smelter at San Francisco, Cal., a distance of 5,000 miles, the greatest distance any mine in the world is transporting crude ore for treatment. Through a special arrangement with the Canadian Government Mayo has been made a sub-port of entry, thus permitting vessels to load ore direct at that point and carry it to St. Michael. Ore now is being mined for transport during the winter, over the snow and ice to Mayo. When navigation opens next year this will be taken out, as is now being done with that which was mined last winter. The Yukon Government now has a crew of men improving the road so that the transportation problem will be made somewhat simpler. Mr. Grenan says that there is a shortage of hard rock miners in the Mayo District, that wages are $5 a day with board and lodging, and that many prospectors are being attracted from other parts of the Territory.

Stewart, B. C.

R. W. Wood, President of the Premier Mine, states that the new Mill at the Salmon River Property has not yet handled any quantity of ore. It has been turned out and is expected to be working soon at its capacity, 100 tons a day. — Considerable development, with promising indications, is being done by the Outland Silver Bar Mining Company on their property, situated on the west side of the Salmon river glacier, about 23 miles from Stewart. A number of attractive prospects are being opened up on Marmot River, among them the Patricia from which a number of high class samples recently were taken, the assay returns carrying big values in gold, silver and lead.

Trail, B. C.

The receipts of ore at the Consolidated Mining & Smelting Co.'s Smelter for the week ending July 21st aggregated 8,405 tons. Two Slocan District mines joined the shippers during this period, the Anna being credited with 20 tons and the whitewater with 36 tons. Two Washington State Mines, the Knob Hill and the Surprise, sent 47 and 283 tons respectively. Properties

owned by the smelting company were responsible for the remainder, 7,977 tons.

Vancouver, B. C.

That the gold production of British Columbia for 1921 will be considerable greater than that of 1920 is indicated by the receipts up to date at the Dominion Assay Office, Vancouver. The total receipts of bullion this year so far aggregate in value $1,2755,000 as against $1,073,000 for the same period last year. The improvement, generally speaking, is ascribed first to the reopening of the Roseland Mines by the Consolidated Mining & Smelting Co. and, second, to the fact that the placer mining areas are working under more satisfactory conditions, there being plenty of water whereas last year there was a notable scarcity of that necessity.

Northern Ontario Letter

THE SILVER MINES.

The Cobalt District.

A favorable feature at the silver mines in the Cobalt field is that at the producing mines it is being found possible to increase tonnage and, at the same time, to carry on operations with a smaller force of men than when operating at smaller capacity. This is resulting in a very material reduction in the per ounce cost of producing silver. The reason for this, is the higher working efficiency of the men.

One great obstacle in reducing costs to the pre-war level is the prevailing high freight rates. The carrying charges are extremely heavy, and the rates have so far withstood all shocks. There is a growing belief, however, that a substantial cut may be made this fall, in which case mining in Northern Ontario would receive added impetus.

Field work in charge of Cyril Knight for the Ontario Department of Mines is proceeding at a satisfactory rate and the re-survey of the geology of the Cobalt district will be completed late in October or early in November. The work commenced early in the summer of 19290. Mr. Knight told the Journal representative that the Cobalt field presents favorable opportunities for further exploration and that in his opinion there are good prospects of intelligent effort being well rewarded in certain sections of this area. This belief is based upon the knowledge that there are sections where little or no work has been done and where the geological structure bears marked similarity to areas where exploration work has resulted in the discovery and development of ore shoots.

After a delay of a week or so in making repairs to a motor which burned out, the Keeley mill is again in full operation, according to advise from Silver Centre. It is also stated that the underground work at the mine continues favorable. Major J. Mackintosh Bell, consulting engineer for the company is in the northern Alberta oil fields in the vicinity of Great Slave Lake and will return to the Cobalt district within the next few weeks.

Milling operations are to be resumed this month at the Hudson Bay mine, according to official advice. It is the intention of the management to treat all the broken ore by going to as little expense as possible in drawing it from underground, following which the directors will be obliged to determine whether it is advisable to institute a further campaign of exploration and development or to close the mine down. The Temiskaming and Hudson Bay holds the distinction of having paid dividends amounting to 25,000 p.c. on its issuer capital, a record which stands out above any other mining enterprise in the world. The company was organized by a group of business men in the little village of New Liskeard over sixteen years ago, the authorized capitalization being only 25,000 shares of the par value of $1 each. The property was found to be so rich that by the time 7,761 shares had been issued at considerably less than their par value, the company was on a self-sustaining basis. Then followed the sale of part of the property held, together with the development of exceptionally high-grade silver ore on the property still held, and the stock soared from a few cents per share to upwards of $300 per share, and the company distributed dividends at the rate of over 2,000 p.c. in a single year in its banner days. Another distinction held by the Temiskaming and Hudson Bay is that in November, 1905, the company paid a dividend of 200 p.c., this being the first profit disbursement made in Cobalt by any incorporated company. In addition to returning such enormous profit to its owners, the company has assisted in the exploration of new fields throughout Northern Ontario, and in 1919 the charter of the Temiskaming and Hudson Bay was surrendered to the holding company known as the Hudson Bay Mining Company, Ltd. This company holds property in Gowganda and Kirkland Lake as well as having financed the Dome Lake Mining & Smelting Company at Porcupine.

The shaft on the Waldman property of the Oxford-Cobalt has reached a depth of between 40 and 50 feet, at which point the silver deposition is highly encouraging, and officials of the company now regard the development as of distinct importance. Silver has been found to occur alternately in smeltite and in calcite, some of the ore being high grade while a substantial amount of mill ore has been placed in sight. It is stated that but for the unfavorable condition of the road, it would now be possible to send out a carload of mill ore for testing purposes. The plans of the management are to continue the shaft to a depth of about 75 feet at which point the contact is expected to be reached, after which drifting operations will be undertaken close to the contact zone. A feature of the favorable developments on the Waldman is that the theory that silver is most likely to occur in the Keewatin overlying the diabase to a distance of up to about 100 feet from the contact is again being proven. The shallowness of the Keewatin at the point where the present shaft is located is accounting for silver having extended to outcrop, namely, about 75 feet above the contact zone. Another feature is that the underlying diabase dips at an angle of about 25 to 30 degrees, and that as the drift at a depth of 75 feet proceeds it will gradually draw away from the contact, but in due time it will be possible to put down a winze from the drift and thereby keep within the zone of mineralization.

The underground workings on the Violet property of the La Rose have been dewatered and work is again under way on this property. As a consequence of this, the scope of operations by the La Rose has been considerably broadened.

During July the Bailey Custom Mill treated 1,043 tons of ore and realized gross earnings of $12,129.51. The Bailey mine itself shipped 1,262 tons of ore, and continued to improve its physical condition. Officials declare there is more ore in sight on the Bailey than at any previous time during the past six months.

With respect to statements credited to Dr. Ami a few

weeks ago, in which the inference was left that a vast amount of platinum was being lost annually in connection with nickel-copper mining in the Sudbury district, it is a matter of surprise in mining circles that Dr. Ami has not replied to inquiries which were made for the purpose of obtaining either a confirmation or a denial of the statements which were sent broadcast through the daily press. The statements which were erroneous, reflected adversely upon the efficiency of the miners in the Sudbury field, whereas it is well known that those engaged at the Sudbury mines rank among the best in the profession of mining and metallurgy.

Elk Lake and Gowganda.

It is expected that the Cane Silver Mines in Cane township maybe re-opened this fall. The arrangements in connection with raising finances appear to be progressing favorably on the strength of the rich surface showings as well as the shaft on No. 8 vein having shown silver values to continue to a depth of 42 feet. During the course of sinking this shaft, about four tons of ore taken out yielded approximately $1,200, in addition to which is a considerable amount of low grade ore.

An endeavor is being made to re-finance the Triangle Silver Mines, in the township of Auld, formerly known as the Kenebeek Consolidated. Interests closely connected with the enterprise are hopeful of being able to resume operations this fall.

Good headway is being made on the Elk Lake to Gowganda road and automobile travel from the centre of activity in Gowganda to the railhead at Elk Lake will be possible throughout the greater part of the open seasons. The possibility of being able to haul material on motor trucks instead of by horse and wagon holds out promise of greatly reduce expenditure in connection with transportations, a factor which has been one of the main obstacles in the way of extensive mining endeavor in the Gowganda district.

THE COLD MINES.

The Porcupine Field.

A most remarkable fact in connection with gold mining is found in the present "one-sidedness" in the trend of conditions under which the metal is being prodneed. Whereas, during the war and for some time after its close, the economic situation gradually grew worse and was one-sided in that respect, the turn in the opposite direction is now equally pronounced. Where activity gradually narrowed down and where prosperity gradually lessener, there is now a steady increases in the scope of work and there is a steadily rising tide of prosperity.

For the first three months of the company's fiscal year, namely April, May and June, the Dome Mines realized a net profit of $235,000, or at the rate of a fraction over 20 p.c. on its issued capital. This was achieved in spite of operations being greatly restricted in April due to power shortage and when even during May considerable time was lost in getting the mill up to anything near capacity. It is now understood that ore is being treated at a rate which would indicate that at least 100,000 tons will go through the mill during the second quarter, namely, July, August and September and that net profits will reach at least $300,000 for the period.

With respect to the information printed from time to time during recent months in the Journal in which the McIntyre-Porcupine was shown to be making preparations to enlarge its mill, the official announcement now comes from the company that the plant will be increased to about 900 tons a day as compared with the present capacity of 600 tons a day. This is expected to result in gross production of over $3,000,000 a year as compared with a little over $2,000,000 a year recently. The ore averages between $10 and $11 to the ton and the net profit amounts to nearly 50 p.c. of the total yield. Even allowing costs to absorb $6 a ton and profit to amount to $3 a ton, the net profit thus indicated would amount to $1,200,000 a year and would be equal to 33 p.c. on the companies issued capital of $3.640.000. The McIntyre will pay a dividend of 5 p.c. on September 1st.

An offer of 20 cents per share has been received by the Porcupine V. N. T. Mines for its treasury stock, but the officials are determined not to sell at such a low figure. It is pointed out that under less favorable conditions than appear to be opening out before the enterprise, the stock was in strong demand on the open market at from 70 to 80 cents a share. The officials believe they will still succeed in arranging for the finances necessary to resume operations this fall at full blast.

Gold mine operators in general in the Porcupine district seem to feel quite confident over the hydro-electric power situation following the official announcement made through the Journal by the Northern Canada Power Company that there is no reason to feel apprehensive over the supply.

Kirkland Lake.

A decision to proceed with the enlargement of the mill on the Teck-Hughes mine is one of the favorable features in connection with the producing mines of the Kirkland Lake district. It is planned to increase the capacity of the plant by about 40 tons daily, the present rate being approximately 120 tons a day. The mine is understood to be on a profitable basis of operation and is expected to soon be in a position to commence paying off its bonded indebtedness.

The work in connection with equipping the Ontario-Kirkland with a mill of 100 tons daily capacity is proceeding satisfactorily. Among other things, a shaft has been provided at a central point by driving a raise from the 300-ft. level.

At Boston Creek, diamond drilling is under way at the 500-ft. level of the Miller Independence mine. Considerable importance attaches to this work.

PORT ARTHUR NOTES.

Silver Islet Mine.

J. J. O'CONNOR.

Silver Islet took on some of the appearance of its old time activities and interest, on the occasion of a visit by the Executive and shareholders of the Islet Exploration Company Ltd., together with a party of friends on the 1st instant.

Tall stacks belching black smoke, and a scene of general mining activity on the Islet, took one back almost forty years to the time when such scenes and similar activities, were part of the daily life history, of fifteen years of the most venturesome and picturesque mining enterprise on this continent.

The party reached the Islet about noon, on the tug "James Whalen" and landed alongside the old bulk head at the mine. In the party were; J. L. Washburn, President of the Islet Exploration Company Ltd., A. McC. Washburn, Vice President, Frank B. Randall, Secretary-Treasurer, A.M. Chisholm, capitalist and mine owner, Dr. D. C. Frood, Head physician to the U.S. Steel Corporation, E. C. Congdon, capitalist and mine owner, P. Field, W. D. Baily, capitalist, F. A.

Cokefair, President Lake Superior Loader Company, R. C. Jamieson, D. C. Peacock, G. M. Baird, capitalist, Memphis, Tenn., Frank H. Keefer, M.P. Port Arthur, Dr. R. J. Manion, M.P. Fort William, G. R. Duncan, Fort William, Mayor Matthews of Port Arthur, and several prominent citizens of the two cities at the head of the Lakes.

Luncheon was served to about thirty five guests in the Boarding House. After the luncheon, about two thirds of the party, including nearly all the shareholders donned miners garb and went underground, under the direction of D. C. Peacock, who is in charge of the operations. After the underground inspection, an informal meeting was held in the office, where an array of rich silver was displayed, running into thousands of ounces per ton.

Mr. Peacock had prepared a working model of the Macfarlane dyke, in which the silver occurs at Silver Islet, showing the old workings to a depth of 1260 feet, together with the lateral working both east and west, together with the great fault, where the silver is deposited, also including the known vein system that exists to the westward, all of which intersect the dyke at points varying from about 400 to 1200 feet westerly from the old workings.

Mr. Peacock addressed the meeting briefly, giving the history of the silver occurrences as found under the old regime, fully explaining the conditions that were met with, and gave it as his studied opinion, that similar conditions would be found at one, or all of the intersections with the dyke, of the vein system known to exist to the westward., illustrating his points by the working model of the dyke, which proved most illuminating.

The meeting was also addressed by President Washburn, who gave an outline of the undertaking, pointing out that the venture was being undertaken by men of capital and experience and that if it should prove a failure, could afford to lose their investment, and that voluntary investors composed the company. Frank H. Keefer, M.P., Dr. R. J. Manion, M.P., and Mayor I. L. Matthews of Port Arthur, also spoke

The Islet Exploration Company are carrying on their exploratory work under the most encouraging and promising conditions. The enormous richness of the area surrounding the intersection of the MacFarlane dyke by the Silver Islet vein was only discovered by the accident of its nine feet exposure above the surface of Lake Superior. Had this portion of the dyke been covered by even a slight depth of water, the millions of dollars that this point produced, might still be there, and the romantic history of its extraction have been lost to the annals of silver mining in Ontario.

The geological and mineralogical conditions surrounding this intersection, have had, during the past year, the most minute and critical examination at the hands of the present operators, until they are now, to them, an open book. They have found, among other things, that graphite, which is present in considerable quantities throughout, is a dominant factor in the deposition of silver in the vein. While it was often found in the old workings without silver, silver was never found without graphite.

A system of veins, similar to the Silver Islet vein, is known to exist, and to intersect the Macfarlane dyke at points varying from about 100 to 1200 feet to the westward of the Silver Islet intersection. The old mine has now been unwatered to a point below the fourth

level. A drift has been started west from this level, in the graphitic portion of the Island, Catholic Point, and Perry Bay veins, and possibly, as yet unknown veins.

This drift is now in 250 feet, on the first instant, a mineralized calcite stringer was encountered in the face of the drift, encouraging the operators to believe that they were in the vicinity of the Burnt Island vein. This drift will be continued until the intersections of all the known veins have been cut. Meantime, the first objective is the Catholic Point vein, as this is the strongest vein in the system, being thirty feet wide where exposed under the water.

The energy and enterprise displayed by the operators is highly commendable, and worthy of an ample reward. They have the best wishes of mining men everywhere, and it is to be hoped that they will bring Silver Islet back to its old status as an outstanding silver producer.

TORONTO MINING QUOTATIONS.

Quotations on Active Stocks on Standard Stock Exchange for Week Ending 6th August 1921.

Silver.	High.	Low	Last.
Adanac Silver Mines, Ltd	1	1	1
Bailey	2	2	2
Beaver Consolidated	27	26½	26½
Coniagas	1.60	1.60	1.60
Crown Reserve	10	9	9
Gifford	1⅜	1	1
McKin.-Dar.-Savage	11	11	11
Mining Corp. of Can.	1.16	1.15	1.16
Nipissing	5.15	5.15	5.15
Peterson Lake	5	4½	5
Temiskaming	23	22½	22½
Trethewey	14½	13½	14½
Gold.			
Atlas	24	22	23½
Dome Lake	7¼	6½	7¼
Dome Mines	19.95	19.25	19.50
Gold Reef	2½	2½	2½
Hollinger Cons.	7.15	7.10	7.10
Hunton Kirkl'd G.M.	6½	5	5
Keora	10½	9⅜	9½
Kirkland Lake	38	37	38
Lake Shore M. Ltd.	1.20	1.15	1.20
McIntyre	1.95	1.92	1.94
Newray Mines Ltd	5¾	5¾	5¾
Porcupine Crown	14½	14	14½
Porcupine Imperial	½	½	½
Porcupine V.N.T.	18½	16¾	17
Schumacher	21	19	21
Teck-Hughes	15½	12½	15¼
Thompson Krist	4½	4½	4½
West Dome	7⅝	7	7¼
West Tree Mines Ltd	4¾	4¾	4¾
Wasapika Gold M. Ltd.	7	5⅞	5⅞
Miscellaneous.			
Petrol Oil	23	23	23
Rockwood Oil, Gas	1¼	1¼	1¼

Premier Lloyd George says he can see "the light at the end of the tunnel". A London financial paper asks whether it is red or green? Opinions as to the irreverance or irrelevance of this comment presumably differ according to one's political vision. If Lloyd George sees the light we'll bet it is not yellow, at any rate.

METAL QUOTATIONS.

Following are the fair average prices for ingot metals (in less than car-loads).

	Cents per lb.	
Montreal.	August 4th.	August 10th.
Copper, electric	17¼	17¼
Copper, casting	17	17
Tin	34	35
Lead	6¼	6½
⅜inc	7	7
Aluminum	29	29
Antimony	7	7
Toronto	August 3rd.	August 10th.
Copper, electric	17	17
Copper, casting	16¾	16¾
Tin	37	35
Lead	7	6¾
⅜inc	7	7
Aluminum	28	28
Antimony	9	9

TORONTO COAL PRICES.

(By Our Own Correspondent).

Toronto, 10th August.—The bituminous situation is in an unsettled condition. Business is up one day, and down the next. In this respect, it but reflects the instability of business conditions generally, at this moment. In the United States, the railroads and the steel industries are beginning to pile up their reserves of bituminous coal, but most other industries are still pursuing a hand-to-month policy. In Canada, neither the railroads nor any of the big industries are taking steps to build up their reserves of cial in the normal fashion

As regards bituminous prices, that of lump is at rock bottom. Its price at the mines is from $2.50 to $2.85 a ton, varying with the district and the quality of the coal. The price of slack is still advancing, and is now anywhere from $1.75 to $2.15 a ton. The recent advances in the price of slack are due not so much to the demand for it as to the scarcity of screenings. In other words, with so little demand, as there is, for lump coal, slack is scarce. One thing seems certain—there will be no more cheap slack this year. A point worthy of mention is the immense difficulty that is being experienced in the collection of accounts for coal. Firms that one would not dream could be short of money are showing themselves unexpectedly "long-winded," just now. This tends to confirm the general idea that the financial stringency is both exceptionally acute and exceptionally widespread.

In reference to anthracite, the situation in Toronto is showing some improvement, dating from about the first of this week. The public at last seem to be making up their minds that there is not likely to be any reduction in prices consequent on the reduction that they seem to anticipate in freight rates. A reduction in freight rates, by the way, is not likely to occur until next April—so I am informed by those who claim to speak with some knowledge—and is practically certain not to take place, at any rate, before the 1st of next January. Supposing that a reduction in freight rates should take place on the 1st of January, it would take two or three months from then to become operative, so far as the coal consumer is concerned. However, the public—or, at least, that portion of the public which may be considered well-to-do or moderately so—seem at last to be waking up to the fact that anthracite prices are unlikely to come down.

The Canadian Miners' Buying Directory.

Acetylene Gas:
Canada Carbide Company, Ltd.
Prest-O-Lite Co. of Canada, Ltd.

Acetylene Welding:
The Toronto Iron Works, Ltd.

A.C. Units:
MacGovern & Co
Powley & Townsley, Limited.

Agitators:
The Dorr Co
Can. Chicago Bridge & Iron Co., Ltd.
Horton Steel Works, Limited.

Air Compressors:
Belliss & Morcom, Ltd.
Laurie & Lamb

Air Hoists:
Canadian Ingersoll-Rand Co., Ltd
Mussens, Limited.

Air Receivers:
The Toronto Iron Works, Ltd.

Alloy and Carbon Tool Steel:
International High Speed Steel Co., Rockaway, -
Peacock Brothers Limited.

Alternators:
MacGovern & Co.

Aluminium:
Spielman Agencies, Regd.

Amalgamators:
Northern Canada Supply Co.
Mine and Smelter Supply Co.
Wabi Iron Works.

Antimony:
Canada Metal Co.

Antimonial Lead:
Pennsylvania Smelting Co.

Arrester, Locomotive Spark:
Hendrick Manufacturing Co.

Assayers' and Chemists' Supplies:
Dominion Engineering & Inspection Co
Lymans, Limited
Mine & Smelter Supply Co.
Pennsylvania Smelting Co.
Stanley, W. F. & Co., Ltd.

Ash Conveyors:
Canadian Link-Belt Company

Ashes Handling Machinery:
Canadian Mead-Morrison Co., Limited
Canadian Link-Belt Co., Ltd.

Assayers and Chemists:
Milton L. Hersey Co., Ltd.
Campbell & Deyell
Ledoux & Co.
Thos. Heys & Son
C. L. Constant Co.

Asbestos:
Everitt & Co.

Balls:
Canadian Foundries and Forgings, Ltd
Hull Iron & Steel Foundries, Ltd.
Peacock Brothers Limited.
The Wabi Iron Works.
The Hardinge Conical Mill Co.
The William Kennedy & Sons, Ltd.

Ball Mills:
Hardinge Conical Mill Co.
Hull Iron & Steel Foundries, Ltd
Mine and Smelter Supply Co.
The Wabi Iron Works.
The William Kennedy & Sons, Ltd.

Balances—Hensser:
Mine and Smelter Supply Co.

Babbit Metals:
Canada Metal Co.
Hoyt Metal Co.

Ball Mill Feeders:
Hardinge Conical Mill Co.
Hull Iron & Steel Foundries, Ltd

Ball Mill Linings:
Hardinge Conical Mill Co.
The William Kennedy & Sons, Ltd.
Peacock Brothers, Limited
Hull Iron & Steel Foundries, Ltd.

Belting—Leather, Rubber and Cotton:
Canadian Link-Belt Co., Ltd.
The Mine & Smelter Supply Co
Northern Canada Supply Co.
Jones & Glasco.

Belting:
R. T. Gilman & Co
Gutta Percha & Rubber, Ltd.

Belting—Silent Chain:
Canadian Link-Belt Co., Ltd.
Hans Renold of Canada, Limited, Montreal
Jones & Glassco (Regd.)

Belting (Transmission):
Goodyear Tire & Rubber Co

Belting (Elevator):
Goodyear Tire & Rubber Co

Belting (Conveyor):
Goodyear Tire & Rubber Co
Gutta Percha & Rubber, Ltd.

Bins and Hoppers:
The Toronto Iron Works, Ltd.
Can. Chicago Bridge & Iron Co., Ltd.
Horton Steel Works, Limited.

Blasting Batteries and Supplies:
Canadian Ingersoll-Rand Co., Ltd
Mussens, Ltd.
Northern Canada Supply Co.
Canadian Explosives, Ltd.
Giant Powder Co. of Canada, Ltd.
Powley & Townsley, Limited.

Bluestone:
The Consolidated Mining & Smelting Co
The Conlagas Reduction Co., Ltd.

Blowers:
Canadian Fairbanks-Morse Co., Ltd
MacGovern & Co., Inc.
Northern Canada Supply Co.
Fraser & Chalmers of Canada, Ltd.

Boilers:
Northern Canada Supply Co.
Canadian Ingersoll-Rand Co., Ltd
Marsh Engineering Works
MacGovern & Co., Inc.
R. T. Gilman & Co.
Fraser & Chalmers of Canada, Ltd.
The John Inglis Company
Wabi Iron Works.

Blue Vitriol (Conlagas Reg):
Canadian Fairbanks-Morse Co., Ltd.

Bortz and Carbons:
Diamond Drill Carbon Co.

Boxes, Cable Junction:
Standard Underground Cable Co. of Canada, Ltd.
Northern Electric Co., Ltd.

Brazilian Rough Diamonds:
Diamond Drill Carbon Co.

Brazilian Mica:
Diamond Drill Carbon Co.

Buggies, Mine Car (Steel)
Hendrick Manufacturing Co

Brazilian Ballas:
Diamond Drill Carbon Co.

Brazilian Rock Crystal:
Diamond Drill Carbon Co.

Brazilian Tourmalines:
Diamond Drill Carbon Co.

Brazilian Aquamarines:
Diamond Drill Carbon Co.

Bridges—Man Trolley and Rope Operated—Material Handling:
Canadian Mead-Morrison Co., Limited

Bronze, Manganese, Perforated and Plain:
Hendrick Manufacturing Co.

Buckets:
Canadian Ingersoll-Rand Co., Ltd
Canadian Mead-Morrison Co., Limited
The Electric Steel & Metals Co.
R. T. Gilman & Co.
Hendrick Manufacturing Co.
Canadian Link-Belt Co., Ltd.
Marsh Engineering Works
Mussens, Ltd.
MacKinnon Steel Co., Ltd.
Northern Canada Supply Co.
Fraser & Chalmers of Canada, Ltd.
The Wabi Iron Works

Buckets, Elevator:
Canadian Link-Belt Co., Ltd.
Hendrick Mfg. Co.
Peacock Brothers Limited.

Cable—Aerial and Underground:
Canada Wire & Cable Co.
Northern Canada Supply Co.
Standard Underground Cable Co. of Canada, Ltd.
Peacock Brothers, Limited

Cableways:
Canadian Mead-Morrison Co., Limited
Fraser & Chalmers of Canada, Ltd.
Mussens, Ltd.
The Wabi Iron Works
R. T. Gilman & Co.

Cages:
Canadian Ingersoll-Rand Co., Ltd., Montreal, Que
Northern Canada Supply Co.
Fraser & Chalmers of Canada, Ltd.
The Electric Steel & Metals Co.
The Mine & Smelter Supply Co.
Mussens, Ltd.
The Wabi Iron Works

MR. H. L. OSBORNE IN CHARGE OF MINING.
Specialties Sales For Samuel Osborn & Co. Ltd.

By A. R. R. JONES.

The firm of Samuel Osborn and Co., Ltd. of Clyde Steel Works, Sheffield, England, manufacturers of a variety of high-speed and carbon-steel products, is one of the highest standing in its own line in the whole realm of industry. Established in 1833 ,it has branches in various parts of the world, including Canada, the United States, South Africa and so forth. The Canadian branch is located at 126 Wellington Street West, Toronto. At this branch it has been fortunate enough to secure the services of Mr. H. L. Osborne in charge of its mining sales department.

The lines that Mr. Osborne is handling for this branch establishment—which is known as Samuel Osborn, Canada, Ltd.—include the following specialities: "Titanic" cast steel and "Hand and Heart" crucible cast steel; Osborn's toughened steel castings; cams, beads and tappets, for gold stamp-bateries; swing-stock, toggle-blocks, adjusting-wedges, pitmen machinery; Osborn's "Titan" manganese-steel castings; Osborn's "Titan" manganese-steel bars and forgings and grizzley bars; and drill steel which is a special line.

Few men are better known to the mining industry in Northern Ontario, and few know the Northland better, than Mr. Osborne. In his previous business career, he was with Mussens, Ltd., in Cobalt, and, while with that firm, he sold steel and iron machinery. Subsequently, he started in business for himself, trading in his own name, at Cobalt and bought from the International High-Speed Steel Company. Business expanding, offices were opened in Montreal, Toronto and Sudbury. Having spent the past thirteen years or so in Northern Ontario, it is natural that he should be well acquainted with the mining industry and thoroughly conversant with conditions there. Moreover, having made a considerable success in his former capacities, his joining up with Samuel Osborn and Co. means the association of a first-rate connection with products of first-rate quality. Such an association would seem destined to be a fortunate one. Naturally Mr. Osborne's particular line of endeavor has always been to cater, with acceptance, to the needs of the mining trade. He formed his present connection last April.

In the course of a talk that I had with him relative to business conditions in his particular lines, he told me that business in the North—in the districts of Kirkland Lake, Porcupine and Cobalt—is coming along very nicely indeed. In the Sudbury district, he added, operations have been curtailed, although his firm is doing a nice business there, so far as it goes. "I was in the North about a month ago," he said, "and things there are looking fine, with prospects of a good boom ahead." It should be added that his firm has an office in Cobalt, where it maintains a stock of the lines which he handles. Mr. Osborne said, in reply to a question I put to him, that there is plenty of labor in the North at present and that it is of a satisfactory kind.

It may be mentioned that Mr. H. Southworth is manager of the Cobalt office of Samuel Osborn Canada, Ltd. Mr. Southworth, who is a mining engineer and has had charge of several mines in Northern Ontario, was for some considerable time with the Deloro Smelting and Refining Company, Ltd. While with that Company, he sold "Steelite," both in Canada and more latterly in England, where he had charge of the Company's offices.

CANADIAN ASBESTOS.

The world's production of asbestos in 1919 is estimated at 140,265 metric tons of which Canada produced 88 per cent or 124,070 tons. Canada's output of 152,162 tons in 1920 was greater than that of the world's output in previous years. The present poor market will doubtless make the 1921 record much less satisfactory than that of last year.

EDITORIAL

FUEL PROBLEMS OF THE FUTURE.

Before the Institution of Civil Engineers in London, Sir George Beilby, the Director of Fuel Research in Britain, delivered the 27th James Forrest lecture on "Fuel Problems of the Future."

A condensation of this valuable opinion, by a competent authority, is contained in this issue, and it has much interest from its bearing on Canadian fuel problems. Sir George Beilby regards lignite as a fuel of coming great importance, and states that although it contains from 40 to 60 per cent of water, "it is today by far the cheapest source of thermal units. He advises British coal miners and owners to keep an eye on the development of lignite in Germany and elsewhere. "According to the extent to which Germany can meet her own requirements for heat and power by the development of lignite, peat and water-power, the output of her coal-mines will be set free for export, and she will thus take a more important place in the markets of the world." If it is realised that Canada contains 95 per cent of the lignite of the British Empire and over 31 per cent of the lignites of the world, and has 73 times as much lignite as Germany possesses, this opinion, if applied to Canada, takes on an aspect of surpassing importance. As, according to the most calculations of the Dominion Water Power Branch, we have only so far developed 5.9 per cent of the Canadian waterpowers available, and as we have also fairly respectable accumulations of peat, what applies to Germany in this connection applies to Canada with hundred-fold emphasis.

Sir George uses a term "availability" that will bear some consideration. In some instances—as in the case of motor spirit—he points out that "there is a decided tendency to regard mere convenience as a sufficient justification for use." We are glad to note his warning "that a general recognition of the availibility and convenience of the more costly forms of fuel must not tempt us to overlook the necessity for a critical examination of the uses to which more expensive fuels are being devoted," because, as we have previously pointed out, there is in Canada a tendency to confound the ideal forms of fuel availability and convenience with the potential natural sources of such ideal fuel. This is particularly true of projects for distillation of oil-shales, although as Sir George remarks: "The problem of mining and retorting these shales profitably in competition with petroleum from oilfields has not yet been solved."

The use of natural gas for industrial operations, instead of conserving this ideal fuel for domestic purposes, and the continued use of anthracite for uses to which bituminous coal is adaptable, are two other glaring instances in Canada of convenience being regarded as a sufficient justification for general use.

In taking steps to conserve the natural gas supplies of Ontario, to carbonize and briquette the lignites of Saskatchewan as a substitute for anthracite; to develop the water-powers of Canada for generation of electrical power, and to work the peat-bogs of Ontario and Quebec for fuel; Canadian policy appears to be working along scientifically approved lines, insofar as those areas bare of bituminous coal are concerned.

Bituminous coal, however, is regarded by this authority as likely to remain the chief course of fuel "not only for Great Britain but for the world at large, and the problems of its winning, preparation and use still occupy the foreground in all serious consideration of the subject." In this connection, attention is drawn to the researches of Mr. David Brownlie on boiler efficiency, which have shown that great savings in the use of coal are possible by the use of modern equipment in boiler-plants and in steam-raising generally. To what extent it will be found possible to utilise the waterpowers of Canada in coalless territory as sources of heat, in distinction to motive power, has not yet been shown, possibly because of an unperfected state of electrical knowledge, but for many years to come,

bituminous coal, mined in Canada or imported from across the border, will be the chief source of heat, and Sir George Beilby's conclusion in regard to conditions in Britain is equally applicable to Canada, namely, that for steam-raising, "the cheapest form of fuel is coal or coke if it is used under reasonably scientific conditions, and so long as this is the case, the use of fuels of higher "availability" will be economically practicable only under very special conditions."

The Dominion Water Power Branch states that the present development of waterpowers in Canada provides a source of power equivalent to that which would be available from the use of 18½ millions tons of coal annually, and calculates that if the present rate of additions to waterpower generating stations continues to 1940, the equivalency with coal will be to the extent of 42 million tons. We venture to believe that this output of electrical power will not be found to minimise the importance of bituminous coal of Canada in those vast areas suffering under an inherent fuel insufficiency that the Canada of 20 years from now may expect to see heavily populated. We shall need all natural sources of power, and our peat-bogs and oil-shale deposits when the day of their utilisation arrives.

THE COST OF LIVING.

The tabulation which appears each month in the "Labour Gazette" on the cost of foodstuffs averaged over sixty cities and towns in Canada commenced publication in 1915. The tabulation was the result of the recommendation of a parliamentary committee early in 1914, and it is fortunate that the work of recording and tabulation was undertaken before the War. The tabulation covers the cost of specified items of necessary living expenditures calculated for a family of five with an income (before the War) of eight hundred dollars per annum. From time to time criticisms of this tabulation have been heard. The selection of the items it covers, and the accuracy of the prices upon which the averages are reckoned, has been questioned, but careful checking of the figures and averages will convince any impartial observer that the work has been well and correctly carried out. It must also be allowed that the same selection of items, tabulated over a long period of years, will give a correct account of the rise and fall of living costs, despite any difference of opinion which may arise as to the fitness of the items selected.

The work of the Department of Labour has now continued long enough to make it possible to review the monthly variation in the cost of foodstuffs, fuel and light and rent over a period covering almost eight ysars, and the information available is most ample in regard to foodstuffs. The cost of the weekly budget of foodstuffs in 1914 varied between $7.50 and $8.00, and there was no notable increase in prices until the last quarter of 1918, when the curve began to mount rapidly. At the time of the Armistice the weekly budget had risen to $13.50, and the curve showed a tendency to steady, and even to reverse itself during the six following months. In the last half of 1919 the upward course of prices was accelerated and the curve became very steep, reaching a peak at $17.00 in June 1920. Since July 1920 prices have declined with greater rapidity than they rose, and the latest report for July 1921 gives the necessary expenditure on foodstuffs as $11.00 per week, bringing prices back to approximately where they were in the Spring of 1917. The cost of foodstuffs has therefore dropped in twelve months by a figure that is equal to the rise of the thirty-eight months previous to June 1921.

A continuation of the rate of decline in the cost of foodstuffs manifested since June 1929 would result in the weekly expenditure falling to 1914 figures by the end of the current year. The decline has been so marked and so precipitate that some flattening of the descending curve is not improbable, but there is every reason to believe that the tendency will be downwards for months to come, except as it may be locally influenced by actual failure of crops and transportation difficulties.

The more important wage advances given in the United States dated after the Spring of 1917 and the most far-reaching of the wage advances, that given to the railwaymen under stress of war conditions in the United States, was, somewhat incongruously, extended automatically to Canada; and, combined with the increases given to coal-miners, brought about the most considerable portion of the increased cost of living. It should not therefore pass unnoticed at this time that foodstuffs, representing approximately sixty percent of living costs, have returned to where they were before the United States went to war, and before wage increases had become general.

THE UNWISDOM OF WOODEN BUILDINGS.

At the Fire Chiefs Convention held at Three Rivers, Que, a resolution was put and seconded asking for federal and provincial prohibition by legislation of the use of wooden shingles for the roofing of buildings. The resolution was not further acted upon, but the incident is an encouraging indication that there is a growing realisation of the danger of wooden buildings and a desire to substitute non-combustible materials in building. A recent visit to the Maritime Provinces has given the Editor opportunity to compare certain towns and cities with their state a few years ago, and nothing has been more striking than the ravages of fire. Communities are deprived of hotel accommodation, of school buildings, places of worship, and commercial establishments in a really pitiable manner, and great black gaps in the main streets of large communities represent buildings that were a communal necessity. In all too many instances the burnt buildings are being replaced by wooden structures, and the same conditions of potential loss and danger are being thoughtlessly repeated. During recent forest fires, the wooden building and the

shingle roof must have greatly worried a population that saw their homes exposed to showers of sparks and threatened by every rising wind. In a country that provides such a variety of incombustible building material as Canada it seems advisable that communities and individuals should weigh the smaller cost of wooden erections against the risk they entail and the worry they bring, and it is more than likely that a correct casting up of the things that are for and against wooden buildings would reveal that it is cheaper in the long run to use stone and brick, terra-cotta, asbestos and asbestic, concrete and steel, and the approved materials of modern building that this country so uniquely and so richly provides.

IN a thoughtful address delivered by Mr. Edgar Crammond to the Institute of Bankers in London on June 28th last the speaker defined Capital as meaning "in its ultimate analysis principally organisation." In such matters of negotiation between Capital and Labour as wages and hours—matters in which differences of opinion can hardly be avoided — Mr. Crammond suggests that it would be a piece of incomprehensible folly on the part of Labour, at a period when the world is entering upon an era of intensive competition, to weaken the position of the organisers in the great competitive markets of the world. In regard to Capital, Mr. Crammond suggests that it is of no avail to point out to workers that the war caused tremendous losses which will involve a lower standard of living, but that a constructive policy must actuate any proposals put before workmen.

It will be generally recognised by those who have had to do with employment during the last few years that the questions of rate of remuneration and length of working day are secondary in their damaging effects on business to the general destruction of organization in industrial enterprises. Labour leaders, who need votes to keep in power like democratic politicians, have pandered to the mediocre and least efficient in union ranks, and they have brought about thereby a condition that prohibits the efficient man from demonstrating his real capacity, and strangles productivity to prevent exposure of the inefficient. Even if one admits the full implications of the slogan of the international trade-unionist, namely, "All wealth belongs to the producer," it should be fairly evident that there can be no greater amount of wealth for distribution than is produced by labour. If production is hindered, the creation of wealth is correspondingly hindered. Negotiations between employers and workers in recent years have been marked by a consistent demand on the part of the workers for less work and work of an easier kind. The demand for higher wages, and the granting of this demand, has been more a reflex of inflated paper currencies than anything else, and when remmneration for labour is received in tokens that change in purchasing value, it is really very difficult to gauge the effect of wages upon production. The definition of a "fair day's pay" is difficult, but, in some quarters, the definition of a "fair day's work" is clearly declared to be as little work as possible. This is the view of those who regard the capitalist as the chiefest manifestation of original sin, but there is a large and influential body of workers who cannot see where employment is to come from if the employing agency is destroyed. It might be well borne in mind by both sides to this eternal controversy, in the days immediately ahead of us, that a fair day's work is the only condition which will enable the employer to give a fair day's pay. The pay admittedly is created by the work, and if the work is not done, then the pay will not be forthcoming.

MR. CRAMMOND further comments on the fact that in 1921 the percentage of national income in British which is expended on national services is 23 per cent, comparing with 8½ percent in 1914, and that the amount of money left for replacing depreciation of works and the maintenance of capital investment, for new investments at home and abroad, has dropped from 23.7 percent in 1914 to 5.4 percent in 1921. The mere cost of government and national defence in Britain is now estimated to take 32 percent of the national income. Similar conditions face Canada, the United States, France, Italy, Spain and Japan. A more convincing argument for general world disarmament could scarcely be adduced. Under such conditions it is a disturbing thing to observe that the nations of the world are now feverishly building the biggest warships, the biggest guns, the largest radio-stations; are perfecting the deadliest toxic gases, designing new weapons of precision for bombing from airplanes, developing fast and mobile "tanks", and doing many other things the world is not told about, all in preparation for future wars. The bright spot on the horizon is President Harding's invitation to a disarmament conference. If the Kaiser has a sense of humour — which is improbable — he might sweeten his remorse by indulgence in sardonic mirth at mankind's curiously persistent desire to reduce the population of the world.

NEW QUARTERS FOR MINE INSPECTION DEPARTMENT.

The new home of the mine inspection department of Ontario at Queens Park will soon be ready for occupation. The building had been previously occupied by the Public Health department and the Assay department. The mine inspectors' office is at present in the Parliament Building where there is no room for testing laboratories. The new quarters will provide much needed space. There is at present being installed a Livins-Olsen testing machine for the testing of wire cables used at mines. Previously the department had no apparatus for the making of the tests which will be requiired under the new mining act.

In altering the building, increased accommodation will be provided for the Provincial Assay laboratories which have been for some years in this building.

The new regulations regarding testing of hoisting cables are not yet in force; but in the new act provision was made that they may be put in force at any time by order-in-council.

Fuel Problems of the Future

"Times" Engineering Supplement.
JAMES FORREST LECTURE.

In delivering the 27th James Forrest lecture before the Institution of Civil Engineers, Sir George Beilby, the Director of Fuel Research, chose as his subject "Fuel Problems of the Future."

As a preliminary he reviewed the fuel position of the world as disclosed by figures given for 1920 by the United States Geological Survey. In that year the total output of coal, including brown coal and lignite, was 1,300 million metric tons, an amount within 3 per cent. of the maximum output which was reached in 1915 and 1918. Of the total the United States produced 45 per cent., Great Britain and the British Empire 22 per cent., and Germany 19 per cent. A significant feature is the rapid development in the winning and use of brown coal and lignite in Europe, and particularly in Germany, where the output last year reached 111.8 million tons, nearly 18 million tons more than in 1919. The total output for Europe was 140.7 million tons, and for the world about 143 millions. Though in its natural state a less concentrated fuel than bituminous or anthracite coal, brown coal has many points in its favour, the chief being the low cost at which it can be won as compared with ordinary coal. Though it contain from 40 to 60 per cent. of water, it is to-day by far the cheapest source of thermal units, and its further manufacture by drying, briquetting and carbonization can be carried out close to the point of excavation and under conditions favourable to production on a large scale, and, therefore, at a low cost. British coal miners and owners will be well advised to keep an eye on the development of brown coal in Germany and elsewhere. According to the extent to which Germany can meet her own requirements for heat and power by the development of lignite, peat and water power, the output of her coal mines will be set free for export, and she will thus take a more important place in the markets of the world.

Oil.

Of oil, the other great natural source of fuel, the world's output in 1920 was about 97 million tons, amounting to 7 per cent. of the fuel in tons, or 10 per cent. if reckoned in potential terms. As the United States, which produced 64.8 per cent. of the total, has extensive oil interests in Mexico, which produced 23.3 per cent., it may be taken that last year she controlled 75 to 80 per cent. of the world's output, and it is therefore significant that in official quarters great anxiety has been expressed as to the probable exhaustion of her resources. According to a statement by Mr. J. O. Lewis, Chief Petroleum Technologist to the U. S. Bureau of Mines, indicates that about 40 per cent. of the oil had been brought to the surface, and that the 60 per cent. remaining underground would last barely 20 years at the present rate of consumption. The domestic production, in the opinion of Mr. Lewis, will undoubtedly be spread over a much longer period than that estimated, but on the other hand the peak of production will be passed long before 20 years, and production will thereafter be at a declining rate. He points out, however, that there are enormous undeveloped resources in other parts of the world, and also that oil may be obtained from other sources than oilfields. The U. S. Geological Survey has estimated that the quantity of oil locked up in the richer oil shales of the three States of Colorado, Wyoming, and Utah is perhaps ten times greater than the amount of the reserve in the oilfields, though the problem of mining and retorting these shales profitably in competition with petroleum from oilfields has not yet been solved.

Alcohol.

Sir Frederic Nathan, the Power Alcohol Investigation Officer of the Fuel Research Board, reports that experiments made last year on the cultivation of Jerusalem artichokes indicated that very good yields of alcohol per acre can be obtained from them, and if these results are confirmed by experiments in the present year it may be desirable to consider the possibility of growing this tuber to supply a limited quantity of alcohol for special purposes, such as aviation. Examination of the artichoke stems has indicated that it may be possible to convert them by a simple treatment into paper pulp.

The use of cellulosic materials is not yet possible, because although research work is in hand to find a process that could be employed on a commercial scale in those regions where such materials exist in definite results. Where, however, materials capable of easy hydrolysis exist, as, for instance, in the case with waste rice straw, the recent large scale experiments in Burma Oil Company, appear to indicate that the joint production of alcohol and paper should be a commercial possibility.

Until alcohol can be made from waste materials which can be collected and treated at small cost, it does not seem likely that Empire-produced alcohol can be imported into this country on any considerable scale; it is improbable that it can be produced cheaply enough or in sufficient quantities from materials grown for the purpose in those oversea portions of the Empire, which will no doubt before long produce it in this way for local consumption.

Peat.

In Germany, as a result of experience gained with the Wiesmoor station, which has been in operation since 1910, it is proposed to establish a line of generating stations fired by peat, extending from Konigsberg on the east to Wiesmoor on the west. This scheme appears to ignore the fundamental difficulty which applies to the winning of peat in quantities sufficient to meet the day-by-day requirements of any large central station. When it is realized that the peat deposit in a good bog 20 ft. deep is only the equivalent of a 12 in. or 14 in. seam of coal, it will be evident that even an output of 1,000 tons a day of air-dried peat involves the laying out and development of an enormous surface. At the Zehlonbruck plant, near Konigsberg, it is proposed to use 920,000 tons per annum, or about 2,500 tons per day. Professor Purcell, the peat investigation officer of the Fuel Research Board, states that to win mechanically 900,000 tons of air-dried peat in one season at least 4,500 men, women and children would be required, and the area over which the spreading and drying operations would extend could not be less than 9,000 acres, or say 15 square miles. He suggests that in dealing with any production over 60,000 to 80,000 tons per annum from

any single district the difficulty would increase as the square of the production.

As regards the Fuel Research Board's own work in Ireland last year, peat was cut, macerated, spread on the bog at Turraun, aid-dried, and harvested there, and 100 tons of it were sent to the Fuel Research Station at the beginning of this year. On arrival it contained about 27 per cent. of moisture, which was reduced to about 17 per cent. after it had been kept under cover for some months. This peat is in the form of hard blocks of various lengths up to about 10 in., with a cross section of something like 2 in. by 2 in. Its density is rather under 1, or about twice that of the ordinary handcut sods made on the same bog. The blocks can be sawn and cut like hard wood, and they stand transportwith very little breaking up into smalls. In this respect they contrast very favonrably with the ordinary hand-cut sods, which break down seriously in transport by rail or road. Steam-raising trials have shown that they are an excellent fuel. They also lend themselves admirably to carbonization, whether in vertical retorts at temperatures between 700 deg. and 900 deg. C. or in steel retorts at 550 deg. to 600 deg. The charcoal resulting from carbonization is an ideal fuel for suction gas producers.

"Availability" of Fuels.

As coal is likely to remain the chief source of fuel not only for Great Britain but for the world at large, the problems of its winning, preparation, and use still occupy the foreground in all serious consideration of the subject. The greatest problem of the future is to determine what proportion of the coal—about 139 million tons in Great Britain—now burnt in its natural or raw state it will pay to subject the preliminary carbonization or gasification, with the object of sorting out the potential thermal units into groups of higher availability or greater convenience as fuels—*e.g.*, gas, motor spirit, fuel oils, and coke. Though these operations necessarily involve the expenditure and loss of some of the thermal units of the coal, so that the collective thermal value of the new fuels is less than that of the original coal, yet the loss may be more than compensated for by the increased value of some of the new fuels. At the prices of to day a "therm" in the form of coal costs from 1d. to 2d., while in the form of motor spirit its cost is from 20d. to 25d., and in the form of town gas 10d. to 15d. These figures show the premiums which can be paid for the higher "availability" of special fuels. The general recognition of the value of the availability and convenience of the more costly forms of fuel must not tempt us to overlook the necessity for a critical examination of the uses to which the more expensive fuels are being devoted.

In the case of motor spirit there is a decided tendency to regard mere convenience as a sufficient justification for its use. While for swift transport by air and by road there is no cheaper substitute in sight, there are good grounds for believing that for the heavier forms of traffic motor spirit may be replaced by much less expensive fuels. A certain amount of success has already been attained in the use of small suction gas producers in the slower and heavier classes of motor vehicles. The most hopeful prospect in this direction appears to be based on small suction gas producers which ought in the first instance to be definitely designed for and worked with one definite type of solid fuel. The most important features which must be taken into account are—freedom from tarry or oily impurities, density, inflammability, and the quantity and nature of the mineral ash.

Low Temperature Carbonization.

The carbonization of selected coals at 550 deg. to 600 deg. C. yields a coke which, while still containing 10 to 12 per cent. of volatile combustible matter, burns with a very slightly luminous, perfectly smokeless flame. Undoubtedly if this smokeless solid fuel could be produced at a cost permitting of its being sold at little more than the price of the coal it would replace, it would lead to a complete revolution in domestic heating, and among other good things to the abolition of black smoke from house fires. This attractive prospect has been spread before our eyes for many years by enthusiastic inventors and company promoters, yet its realization seems always to move a little farther into the future.

The problem really has two distinct sides—the technical and the economic. On the economic side the data for a final solution will be obtained only after the technical solution has been reached. Until a fair-sized industrial plant has been carried on continuously over a long period, making and disposing of all the products of carbonization under steady market conditions, no one can say whether or not the business will be a profitable one. On the engineering side, an efficient and not too costly apparatus must be designed and constructed, in the working of which manual labour, fuel consumption, and maintenance costs are all reduced to a minimum. In these respects—as well as in its output capacity on a given ground area—the apparatus must stand comparison with gas retorts and oil shale retorts of the most modern types. Only when this ideal has been practically realized can the future of low temperature carbonization as a business proposition be put to the test of continuous working on a large scale under the labour and market conditions of the day.

If low temperature carbonization is proved to be a feasible operation commercially, it would find its first and most natural application to the 35 million tons of coal used for domestic purposes. Were the coal all carbonized it would produce about two million tons of fuel oil for the Navy, or considerably more than the peace requirements, though considerably less than the war requirements. The motor spirit produced would amount to about 100 million gallons. The capital expenditure required for the installation of carbonizing plant for 35 million tons of coal per annum would be of the order of 30 to 40 million sterling.

The application of low temperature carbonization to raw coal which is used in the industries must necessarily depend on the successful solution of the technical and engineering problems to which reference has been made. In this case also the future possibilities of this application depend entirely on the evolution of apparatus and methods which will reduce the capital and working charges of the operation to a minimum.

Steam Raising.

When coal is used for steam raising under the best known conditions, it is obvious that there is little to be gained in thermal efficiency by any preliminary sorting out of the thermal units of the coal into fuels of higher availability. It is well known that an efficiency of 75 to 80 per cent. is attainable in steady practice. If the coal were submitted to preliminary carbonization and its thermal units sorted out in the

form of gas, tar, and coke, the coke would contain 70 per cent. of the thermal units, the gas 12 per cent., and the oils 11 per cent. The intrinsic thermal loss would be 7 per cent. and the heat supplied for carbonization 6 per cent., so that the net thermal value of the products would be 80 per cent. The high thermal availability of the rich gas would be thrown away if it were used for steam raising; the fuel oil would be a fuel oil decidedly superior to the original coal; and the coke would not be of more than equal value to the coal. Solely from the steam raising point of view, therefore, a thermal loss and not a gain would result from the operation. In special cases this loss might be compensated for if a local market for the rich gas were available, but in most cases the margin of profit would be much too small to justify the extra capital expenditure required.

Practicable Economies.

The investigations of Mr. D. Brownlie have thrown a much-needed light on the use of coal for steam raising. He has divided the existing boiler installations of the United Kingdom into three classes—bad, average, and highly efficient—10 per cent. falling into the first class, 85 per cent. into the second, and 5 per cent. into the third. With water-tube boilers the efficiency of the bad class is 61 per cent., of the average class 69 per cent., and of the highly efficient 82 per cent., while with Lancashire boilers the corresponding figures are 49, 60, and 79 per cent. If 75 million tons is taken as the minimum amount of coal used annually for steam raising the scope for economy is enormous, for even an overall increase of 10 per cent. would mean a saving of 7½ million tons annually.

Mr. Brownlie's facts and figures are well worth the careful study of all who are seriously interested in fuel economy. They show the enormous possibilities in this direction which are actually within our grasp if we will only avail ourselves of the knowledge which already exists. No new and revolutionary discoveries are required for their realization. The problem of the future which awaits solution is how to stimulate the practical interest of the owners of steam raising plant throughout the country. For steam raising in this country the cheapest form of fuel is coal or coke if it is used under reasonably scientific conditions, and so long as this is the case the use of fuels of higher availability will be economically practicable only under very special conditions.

MINE MACHINERY ORDERS ASSIST METAL TRADES.

After being shut down for a few weeks the Canada forge plant of the Canada Foundries & Forgings Limited, has been re-opened to take care of heavy forging requirements for the mining industry.

MICA IN NORTHERN CAPE BRETON ISLAND.

The occurrence of workable deposits of mica is reported from the neighbourhood of Neils Harbour, in northern Cape Breton Island, associated with feldspar and white quartz. The areas are owned by M. J. McPherson and F. T. Lemoine of North Sydney, and negotiations for sale are stated to be under way.

HIGH ASSAYS FROM BINGO MINE IN NORTHERN MANITOBA.

The Pas, Man.

By REECE H. HAGUE.

A very favorable light is cast upon the Bingo property, Herb Lake, Northern Manitoba, in a recent report issued by Professor J. S. DeLury, of the Manitoba University, who recently spent some time examining and sampling the property and includes in his report much useful information regarding various properties in The Pas mineral belt.

The Bingo Mine is controlled by a company headed by Joseph Myers, of Winnipeg, who recently secured an option on the Rex property, half a mile distant from the Bingo. It is said that a large tonnage of ore has been blocked out on the Rex, where a rotary mill with a 20-ton daily capacity has been installed but is at present idle.

A considerable sum of money has been spent on the Rex, but the general opinion of mining men is that the best plan would be to scrap the present machinery and recommence work on a larger scale.

Mr. Myers has associated with him English capital, and leaves for England this month with a view to raising additional funds to carry on work on the Bingo and the Rex, if the option on the latter property is taken up.

It has long been thought that the only favorable solution offered to the problems at Herb Lake is to amalgamate some of the properties there and work them under one management, thus considerably reducing operating and general overhead expenses.

Under the heading "Northern Manitoba as a Potential Metal-Producer" Professor De Lury writes:—"Stretching from the Beaver lake gold-mining area in the Province of Saskatchewan in an easterly direction across Northern Manitoba as far as the Hudson's Bay Railway a distance of 100 miles or more, is a wide belt of country occupied by pre-Cambrian rocks, which carry several promising deposits of ore of the different metals. Just over the boundary in Manitoba, east of the Beaver Lake area, is the huge Flin Flon ore-body, with 15 to 20 million tons of copper, gold and silver-bearing ore blocked out by diamond drilling, sinking, drifting and cross-cutting. South of Flin Flon a few miles is the Mandy copper mine, from which several thousand tons of high-grade ore have been shipped under very adverse conditions for transportation. Other copper properties of promise are located in this general vicinity. Farther east, some interesting gold-bearing deposits have been located in the country around Copper and Elbow Lakes. At the eastern end of the mineral belt is the Herb Lake gold-bearing district with which we are more closely concerned. The lack of railroad facilities is delaying development in the copper areas of the western part of the belt. Competent engineers have demonstrated that both the Mandy and the Flin Flon ore bodies will give a safe profit. Competent engineers have shown, too, that some of the Herb Lake gold veins offer attractive inducements. This area has good enough transportation facilities and only lack of capital is keeping it from becoming a profitable gold-producing camp. The fact that all the mines of the belt with a notable production to their credit and all the prospects with considerable development done on them are very close to the water's edge, is significant for the need of a more thorough prospecting of this large area."

In his summary of a report on the Bingo group of claims Professor De Lury says:—"The Bingo group of

mineral claims is located in the Herb Lake gold district, an area of great promise, at the east end of the mineral belt of Northern Manitoba. The claims are 20 miles, half by road and half by water, from the Hudson's Bay Railway.

"The location of the claims with respect to the rocks of the area is favorable.

"The more prominent vein on the Bingo claim, as the result of careful measuring and sampling shows 11.66 inches of ore in its 170 foot shaft running $145.45 to the ton, besides other values of importance not included in this estimate, together with 100 feet of surface which shows an average of 5½ inches of quartz carrying $258.90 per ton. These values in a vein which is accompanied by several parallel and similar veins, all carrying high values, and the good prospects of the continuation of these veins in depth and along the surface which is now made inaccessible by a swamp, together with the fact that the gold is very uniformly distributed through the quartz in these veins and throughout the length of many of the rich veins of the district, lead me to the conclusion that the Bingo group has worderful mining possibilities and to advise that the necessary capital be expended for the proper development of the veins.

"Mining and milling conditions are favorable. Transportation facilities are excellent for a gold-mining camp. Wood, timber, water, mill-site and dumping space are available and can easily be arranged for.

"An estimate of the costs for veins of the size of the Bingo main vein is $20 per ton. There is a possibility that the tonnage might be enormously increased and the cost per ton reduced by the mining and milling of mineralized rock, most of which shows surprisingly good values where tested."

Professor De Lury goes fully into the geological features and occurrence of gold in the Herb Lake district, the first discovery of which was made on the Kiski property in 1914, since when several gold veins have been found and considerable development work been done, particularly on the Rex, Northern Manitoba, Bingo, Kiski-Wekusko and Dauphin-Elizabeth groups of claims.

"The veins" writes Professor De Lury, "strike north east with the prominent structures of the containing formations. They are mostly steeply dipping at angles of 74 to 90 degrees from the horizontal. Some of the veins are traced for over 1500 feet; others for only a few hundred feet, in most of which cases the outcrops are concealed for some lengths by overburden and the lengths of the veins vary from a few inches in some to as high as 15 to 20 feet in others, with an average in the larger ones of between 1 and 4 or 5 feet.

"There are several kinds of quartz in the area. The best gold-bearing veins are a white sugary variety. The minerals found in these veins are; free gold, arsenopyrite, very small amounts of galena, zinc-blende, pyrite and chalcopyrite; telluride in one vein at least; and tourmaline and feldspar are usually present in small quantities. Free gold is commonly seen in the quartz, the most of it being associated with arsenopyrite. The sulphides in most of the ore make a very small percentage of the whole, usually between one and two or three per cent. The sulphides, largely arsenopyrite, are generally more abundant along the walls of the veins and in little bands in the quartz, some of which are parallel to the walls and others in cross and twisted bands. Some free gold is found in quartz with no sign of sulphides in the immediate vicinity.

"The Rex Mine shows a return of over $30,000 worth of gold, from between 500 and 6000 feet of development work on a vein which averaged 3 to 3½ feet in width for a length of 1,700 feet, with an estimated value of $20 to the ton. The shaft is now at a depth of about 270 feet and the vein is strong in the bottom.

"The Northern Manitoba vein produced quartz, which ran over $80 per ton, from its 125-foot shaft sunk on a vein about a foot wide. Other veins in the district have poorer values but some of them are undoubtedly rich enough to warrant extensive development work.

"On the peninsula at the north end of the lake some small veins and stringers occur in an irregular sheared body of granite. The quartz in these is similar to that in the Kiski volcanics and is quite rich. The whole body makes an attractive prospect.

"In an area near the northwest end of Herb Lake, there is an interesting occurrence of silver-bearing galena and zinc blende which further investigation may show to have commercial possibilities. On the whole, the Herb Lake district wears the aspect of a coming important mining camp."

From 82 samples taken from the Bingo by Professor De Lury, an average value of $145 a ton was secured. The Professor states that the values in the mineralized rock and schist of the shaft were surprisingly high. The sampling of this material should be made one of the definite objects in any future examination of the property, he maintains. A sample of mineralized rock with no quartz, picked from different parts of the dump from the shaft to get an indication of the values in that sort of material; and a similar sample, picked to show what was carried in the same kind of material, carrying small stringers of quartz; gave assay returns so high that they seemed incredible, states Professor De Lury, who asked the assayers to check them over. The assayers advised that the samples yielded considerable free gold on panning, enough to make them guarantee the assays as being approximately correct.

The first of these samples assayed $230.60 per ton and the second $228.40 per ton and Professor De Lury says there is a good deal of such material in the dump, and though these assays may be unfortunately high there is good evidence from them that much of the rock near the veins will be valuable milling ore. These results also help to explain the unexpectedly high results taken from the shaft away from the vein proper. There is a suggestion in the whole results from these extra samples that the entire dump from the shaft might be milled at a good profit.

Asbestos Prices.

We have received from the Asbestos & Mineral Corporation of 1919 Broadway, New York, a coloured chart showing the variations in the price of the several standard grades of asbestos from 1912 to the end of 1920. The chart (which is copyrighted) indicates that the greatest and most lasting appreciation in the price of asbestos has taken place in the case of No. 1 and No. 2 crudes, particularly in No. 2 crude. Long fibre appears also to be much more in demand, judging by the course of its selling price, than medium fibre. The rise in the selling price of all grades of asbestos is most striking, Crude No. 1 for example having risen a little over $225 a ton at the beginning of 1912 to a peak of $3,000 at the end of 1918.

ASBESTOS IN ARIZONA.

The University of Arizona has recently issued a Bulletin on asbestos, with particular reference to the occurrence of this mineral in Arizona, of which the "Journal" has received a copy by the courtesy of the Director, Prof. G. M. Butler, who is a joint author of the Bulletin.*

Arizona leads all the states of the Union in production of chrysotile asbestos and under a recent enactment the Indian reservations of the State have been opened for location, leasing and mining of asbestos, long known to exist in the reservations, but hitherto unavailable.

The distinguishing characteristic of Arizona chrysotile asbestos when compared with the Canadian variety, is the low quantity of iron oxide contained in the Arizona asbestos, with it is suggested might make the Arizona variety more suitable than Canadian asbestos for electric insulation. An analysis of a selected specimen of Canadian asbestos, said to be of exceptionally good quality, showed a content of 2.5 percent of iron oxide, whereas five analyses of Arizona asbestos show iron oxide content varying from 0.51 to 0.88 per cent.

Another characteristic of Arizona asbestos is that "a considerable portion of the fibre is somewhat harsh and splintery as compared with the best grade which is soft and silky". This peculiarity is discussed at some length ,and the opinion seems to prevail that the presence of calcite causes the harshness of the fibre. One authority cites the occurrence of veins of fibrous calcite "in which the asbestos appears to have been so completely replaced by fibrous calcite that the calcite is pseudomorphous and preserves the fibrous structure of the chrysotile". Professor J. T. Donald is quoted from the transactions of the General Mining Association of Quebec in 1891 as suggesting that chrysotile with a high proportion of water is more flexible than specimens with less water, and while it is believed that his conclusions are probably applicable to material found in some localities "there are other factors besides the percentage of contained water that affect the flexibility of the fibres".

The known deposits of asbestos in Arizona occur in serpentine in limestone that has been intruded by diabase. The deposits are shown as occurring near Globe, in the Sierra Ancha, near Navajo and Apache reservations. Full particulars of the existing mining operations are given in the bulletin, together with the names of 21 producers of asbestos.

A bibliography is appended, the principle reference being Fritz Cirkel's monograph. One reference which is quoted from this monograph states that in Canada "several attempts at underground mining have proved failures". It is eleven years since the second edition of Cirkel's was issued by the Mines Branch, and much has happened in the meantime, particularly the development of underground mining in the asbestos regions of Quebec. The extreme paucity of the literature on asbestos is shown by the limited number of references, but the omission of the Mines Reports of the Province of Quebec is noticeable. The latest and most authoritative references to asbestos occurrence and asbestos mining are to be found in these reports. There is however a real need for a revised monograph on Canadian asbestos.

* ASBESTOS by M. A. Allen and G. M. Butler. Mineral Technology Series No. 24 University of Arizona and Arizona Bureau of Mines Tuscon, Arizona, 1921.

NOVA SCOTIA COAL MINING NOTES.

At the Toronto Mine at Little Bras d'Or, Cape Breton Island, a mine examiner was killed by a gas explosion on the 8th August. He was carrying a safety lamp and also a carbide lamp. Only small quantities of gas have on a few previous occasions been noticed in this mine, which works an area of coal with a surface outcropping under fairly shallow cover. The use of mixed lights in a coal-mine is never to be recommended, and there is no guarantee that gas will not appear in a coal-mine, no matter what the previous record of the mine.

Mr. W. Foster Brown, who has recently examined the mining properties of the British Empire Steel Corporation, is Chief Mineral Adviser to the Department of Woods and Forests in Britain, and holds the quaint title of Deputy Gaveller of the Forest of Dean. The Department of Woods and Forests administers all the submarine coal in Britain for the Crown, with the exception of a small area in the Cumberland County field which for some reason was sold to the Lonsdale estate. There are no regulations in the Coal Mines Regulation Act in Great Britain with regard to the mining practice to be pursued in mining submarine coal, and these matters are entirely administered within the discretion of the Commissioner of Woods & Forests, who has the power to specify such mining conditions as shall ensure the maximum extraction of coal. Existing leases are also modifiable to suit the conditions that may be encountered in mining, and there has not been any attempt to lay down hard and fast rules regarding submarine mining practice, as it has been realized that only by trial and actual attempt could suitable regulations be framed. The practice of submarine coal extraction is conditioned by depth and nature of cover, by inclination of seams, by the nature of the sea floor, thickness of coal and the number and spacing of superimposed coal-seams, and by absence or presence of faults or lines of weakness or shattering in the measures. It is fairly evident that the factors vary within such wide limits that no hard and fast rules governing practice are possible, except, of course, the rigid rule that all operations projected or being carried on should have the prior approval of the expert authority representing the interest of the Crown. The submarine mining law in Nova Scotia is statutory and inflexible, and it is probable that the next few years will see considerable modification of the regulations now in force.

Mr. Brown, in the course of his visit, has visited the workings of the various submarine collieries in Cape Breton, and has also inspected the underground workings in the iron-ore mines of the Corporation at Wabana, Newfoundland. He has also looked over the operations of the Acadia Coal Co., at Stellarton, N. S.

The disabilities under which the extraction of submarine coal suffered by reason of conflicting lease rights in the Sydney district have been avoided by the consolidation of the Dominion and Scotia companies, but the submarine workings are now so extensive, and form so large a part of the productive areas of the combined companies, that the best available expert advice has been deemed necessary in consultation with the mining engineers of the Corporation.

Production of coal in Nova Scotia is showing much improvement, so far as capacity of the mines for output is concerned. The Dominion Coal Company's Cape

Breton mines, during the week ending the 13th August, reached almost 14,000 tons daily, which is a recovery from the low level of about 10,500 tons daily, caused by war drain on labour.

Preparations for sinking a new shaft at Glace Bay are proceeding. This shaft will tap the Phalen seam near the shore and will give the best point of access possible for winning of the submarine coal tributary to Caledonia Mine (Dominion No. 4 Colliery), now entirely worked out under the land area. The shaft will be large in size, to provide ample capacity for ventilation and hoisting requirements, and will be concreted, where considered necessary.

A new bankhead for the Florence Mine at Sydney Mines, similar in design to that recently completed at the Jubilee Mine of the Scotia Company at Sydney Mines, is understood to be projected. A large area of submarine coal will be drawn to the Florence Slopes, a condition made possible by the consolidation of coal leases.

It is understood recent borings have demonstrated that the Emery Seam in the Glace Bay basin, which underlies the Phalen Seam at a depth of about 160 ft., and extends underneath and outside the whole area of the Phalen is of greater thickness in the eastern portion of the field than has been the case in the workings on the western side, and is regular in its contours.

During the war period the Dominion Tar & Chemical Company at Sydney was unable to dispose of the pitch (which is a by-product of the coal-tar distillation plant that takes the tar made by the Dominion Steel Corporation's coke-oven plant) owing to inability to obtain shipping. It was necessary to store the pitch in ponds on the ground. Recently a cargo of pitch had been dug up into piles for shipment, and as a result of extremely hot weather and the prevalence of bush and grass fires, one of the accumulations caught fire and burned with great emission of smoke. The fluid pitch ran down a drain and threatened for a time to damage the coke-oven plant, but the fire was finally controlled by earth dams. Some rolling stock was burned and the fire caused the Steel Company's officials much anxiety before it was controlled. The loss of the pitch inflicts a severe financial loss on the Tar Company.

The numerous bush fires which have prevailed in the colliery districts during the early part of August have kept the fire-fighting organization of the Dominion Coal Company very busily engaged protecting houses, dams, transmission lines and much equipment that is scattered throughout a district covered by brush and second-growth timber. The situation was a very anxious one during the first week in August, but heavy rains have removed the danger.

The mining towns in Cumberland County were closely threatened by fire in the same period, and much valuable timber, owned by the Dominion Coal Company in the Springhill and Parrsboro section, was burnt over. The general increase of electrical transmission lines in the mining districts in Nova Scotia has brought about a new hazard from forest fires, and thorough clearing of the transmission lines right-of ways seems advisable to prevent, as far as possible, damage from forest and brush fires.

PORTLAND CANAL MINES.

By ALEXANDER GRAY, Montreal.

New York and London bankers, financiers of all nations, are so keen to increase the output of gold—the world is so weary of "paper" money — there are accumulating evidence of activity in meritorious mining enterprises and gold areas, producing or likely to reach the producing stage in the near future. Gold shares, with operating costs coming down and the purchasing power of gold going up, are confidently expected by the highest authorities to be in greater demand.

Canada in particular is most optimistic as to its gold areas—which have reported a steady advancing output while other countries have been lagging. Already Canada has two or three of the greatest gold mines—and others nearly great. The prestige of Hollinger Gold Mines is universally conceded. Northern Ontario has flattering possibilities. It is in the Portland Canal district of British Columbia, however, singular as it may seem, that the most experienced mining capitalists lately have been concentrating in the belief that the Premier Mine section will be the source of much greater production.

The British Columbia Government officially announces that the Premier Mine "bids fair to become the leading gold-silver producer of the Province". Large ore shoots have been "proved to a depth of 600 feet." The Guggenheim-Trites-Wood-Wilson-Daly interests in the Premier have been acquiring other areas, basing their optimism upon Premier developments and outcropping conditions elsewhere.

Not to be outdone, however, New York capitalists not only have taken over the Big Missouri properties adjoining the Premier on the north, but they have now included in their holdings a one-quarter interest in what is known as the International Group of claims, which adjoins the Premier on the south. This latest acquisition takes in the boundary, Cabin, Crub, Crubstake, Lucky and International Fraction of the Daly Group. The owners of the International are the same—excepting the Guggenheims—as those who own the Premier. Pat Daly, who is understood to have negotiated the Big Missouri deal, owns a one-quarter interest in the International Group—and it is this which he is disposing of to the Portland Canal Mines Company. Upon investigation, it is assumed that the International ground has the same geology and mineralogy as the Premier. Portland Canal Mines, therefore, becomes one of the dominant factors in the Portland Canal district. This fact and the extension of the Guggenheim holdings in the district, sustains the statement of the British Columbia Minister of Mines that the Province anticipates a larger gold and silver output from Portland Canal. "From the developments now in progress", writes the chief of the British Columbia Bureau of Mines," it would seem that in a short time the annual production of gold in British Columbia should increase considerably."

Ontario's metallic mineral production to date amounts to about $650,000,000 in value. The metal mining companies have expended about $750,000,000 in exploration, development and mining operations and have paid $125,000,000 in dividends. The difference $225,000,000, between receipts and expenditures is offset by the present value of the assets of the successful metal mining companies.

ROSEATE OUTLOOK FOR GOLD MINING.

By ALEXANDER GRAY.

Extension of the embargo upon the exportation of Canadian Gold has elicited no more than passisg comment. The significance of Ottawa's action is deeper-seated than is discerned outside of banking circles. That gold production and gold mines capable of contributing the yellow metal are to benefit by immutable economic laws, is the frankly-avowed judgment of those whose responsibility it is to hasten the restoration of the world-over equilibrium. Instead of being in disfavor, therefore, bona fide gold mines—anywhere and everywhere—are believed to have entered upon a period of unprecedented prosperity, contingent only upon reduced costs, which are practically assured.

"The world is so full of paper that the resumption of gold standards and rapid increase in the output of gold are essential", writes one now prominent in the Seats of the Mighty.

"Under no circumstances must anything be done to curtail the production of gold", said one of the three outstanding Canadian bankers when he heard of the proposal to impose additional taxes upon Ontario companies.

More gold mines, lower commodities, a purchasing power for gold that will greatly surpass what it has been, caused Mr. Samuel Evans, Chairman of Crown Mines, Ltd., at the Witwatersrand, recently to remark:

> "I am convinced that the turning point has been reached, that henceforth gold will rise in value, and that, if justice is secured for the industry, working costs will decrease as prices fall. There will no doubt be fluctuations as in the past, but for a great many years to come the general tendency will be in the direction of an appreciation of gold in terms of commodities and services. It is within the bounds of possibility that the time may yet come when the Crown Mines will find it profitable to start again at the outcrop and mine three pennyweight Main Reef."

Were Mr. Evans an academic idealist, instead of the administrative chief of a company which last year produced 671,605 fine ounces of gold valued at £2,852,796:14:2, plus the net premium obtained for this gold, amounting to a further £920,062:1:7, he might be suspected of cherishing the "baseless fabric of a dream". Being a sound economist, identified with a group that accounts for about one-half the world's annual gold production—his fancy never has been permitted to enmesh his economics. Before the great tonnage of three dollar ore and over remaining unmined in the Main Reef — one of the series from which the world has been supplied with the larger part of its gold for nearly half a century, can be dealt with, Mr. Evans fully realizes what changes must be made in operating conditions. Gives these remedies, Mr. Evans bases his confidence in the future of gold mining upon these grounds:

> "The unprecedented fall that has taken place in the purchasing power of gold since 1914 is attributable mainly to the world-wide substitution of paper for gold for monetary purposes. It is true that the United States only departed from the gold standard for a comparatively short period (from September 7th, 1917, to June 10th, 1919), but prices were forced up in that country owing to the arrival there in 1915, 1916, and 1917 of a great quantity of gold (the excess of imports over exports of gold being 1,132,023 dollars equal to £232,926,500) which had been superseded by paper in Europe, and the fact that the newly established Federal Reserve system enabled that gold to be used as a basis for an enormous superstructure of deposit and bank more credit. A further cause of inflation in the United States was the action of the Federal Reserve Bank in withdrawing from circulation gold certificates which were fully backed by gold and replacing them by Federal Reserve notes which only required a gold backing equal to 40 per cent. of their face value. When I last addressed you I expressed the opinion that sooner or later gold would come into its own; that it could not be forced back to a currency, the supply of which is determined by the cost of its production."

Although it holds over $3,000,000,000 in gold, the United States cannot extricate its foreign trade relations from the maze of spurious money. Since 1915 belligerent nations of Europe have lost about £400,000,000 in gold—which they want to recover—or as much of it as they possibly can recover. Actually the United States on July 1st, had in stock $3,223,000,000 in gold — said to be equivalent to 40 per cent. of the monetary visible supply. Of this, $2,462,000 was in the reserves of the Federal Reserve Banks. Ordinarily that would permit of inflation of credits. Instead of this, because of the international trade blockade, deflation has proceeded apace. The gold importations during the first half of this year amounted to about $400,000,000—and they emanated from 56 foreign countries. The States drew from this wide field—and the fact is significant as confirming what Mr. Evans asserts; yet not only has the note circulation of the entire Federal Reserve system decreased $867,000,000 since December, or 25½ per cent., but discounts have been reduced $1,300,000,000 to July 1st. Most of the debtor nations being unable to trade at the premium upon exchange on New York — and having inconvertible paper which creditor nations cannot accept—the States has credit to a phenomenal extent and experienced a setback in its export trade in the fiscal year ended June 30 of $1,213,000,000. The break in commodities, involved credits and debits, have dislocated exchange markets, so gold in South Africa and Canada has been commanding a further premium of late — and whether or not debtor nations will be able to do some financing of a temporary character, it is obvious to bankers that greater gold production and a redistribution of the metal will hasten the restoration of economic equilibrium. Mr. Evans painted a glowing picture.

Lighting River Discoveries.

It is reported from Cobalt that prospectors have discovered high grade ore in the Lightning River area and that some very rich samples have been recently brought out.

The Lightning River area lies south of Abitibi lake and is near the Quebec boundary. It is reached by road from Matheson on the T. & N. O. railway or by water from La Reine on the C. N. R. Most of the work done has been in Holloway and Harkor townships.

Gold was found in this area in 1917. A number of veins carrying gold have since been found by stripping. The gold occurs in quartz veins enclosed in basalt or rhyolite or in silicified basalt.

Some account of the geological features and a description of the early discoveries is to be found in a report on the Abitibi area published by the Ontario Department of Mines in 1919.

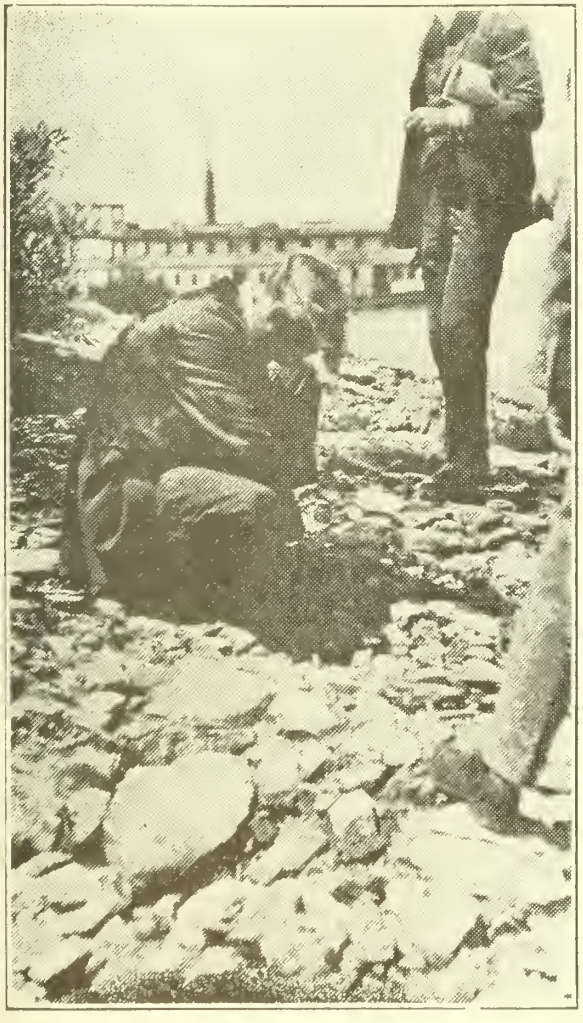
The History and Romance of Oldest Mine in Canada

Found 235 Years Ago by Sieur de Troyes, Commander Of A Detachment Of One Hundred Men Who Found Their Way To Lake Temiskaming.

(By J. A. McRAE, Cobalt.)

Found in 1686; lost in the passing of more than two centuries; found again in 1850—that tells briefly of the finding of what later became known as the Wright Mine, the oldest mine in Canada.

In the National Library of Paris are some notes which deal with the discovery of lead ore in 1686 upon the eastern shore of what is now known as Lake Temiskaming. These notes were taken from the diary of Sieur de Troyes, and are referred to as "Relations and Journal of a journey to the North by a detachment of one hundred men under the command of 'Le Sieur de Troyes', in date of March, 1686."

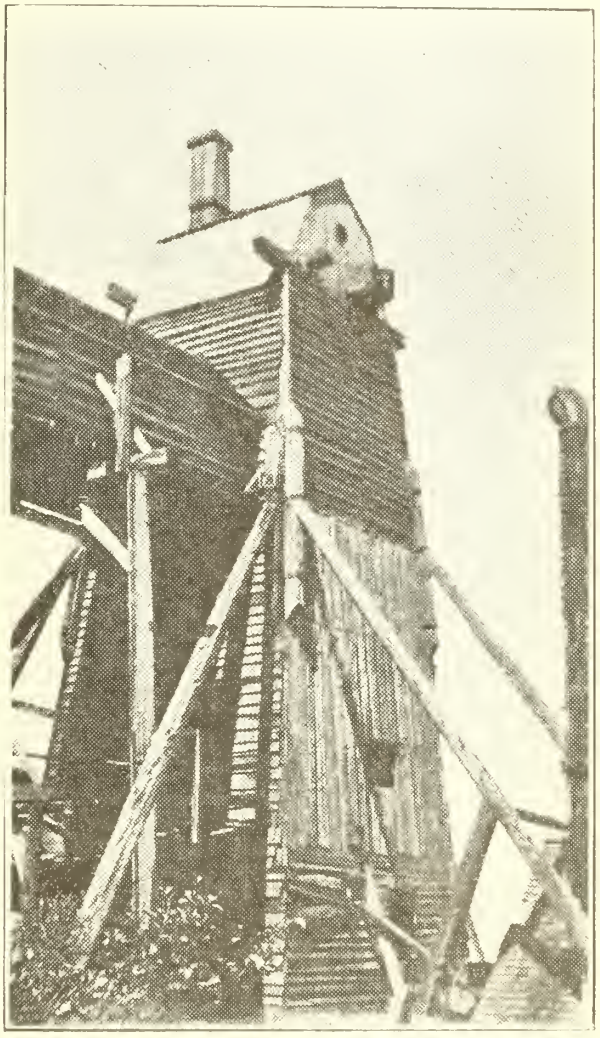


Exact spot where Sieur de Troyes discovered the deposit in 1686. Mining Commissioner T. E. Godson examining the ore.

Thus it was, that at a time when a few venturesome souls, some of them, perhaps, with nothing short of an empire in their brains, and some of them merely the *coureur des bois* of a new continent were engaged in the difficult task of establishing the white race in North Ameriea, that an ore deposit was discovered, only to be lost, they found again after the sway of the Indian tribes had become dissipated before the advance of civilization in Canada.

Names of Officers of the Detachment in 1686.

Chaplain . . . . . Rev. Father Silvie, Jésuite.
Commander . . . . . Sieur de Troyes.
Lieutenant . . . . . Sieur de St. Hélène.
2nd. Lieutenant . . . . . Sieur de Hyberville.
Major . . . . . Sieur de Maricourt.



Shafthouse. Located on the original discovery.

Assistant Major . . . . . Sieur de La Noue.
Board Commissioner . . . . Sieur Lallement.
(Also designed to command a vessel in case we should not locate one to come to Quebeeq).
Captain of the Guides . . . . Sieur de St. Germain.

Narrowly Missed Altering Tide Of Progress In North America.

It is perhaps one of the strangest chapters in Canadian history that while atention was turned to the mineral possibilities of the country as far back as 1686 following this discovery on the eastern shore of Lake Temiskaming yet within three miles of the western shore of the same body of water the fabulously rich silver veins of the Cobalt district actually lay bleaching in the sun until accidentally found in 1903.

Just here, it is interesting to indulge in conjecture as to what influence the discovery of these vast riches in native silver might have had upon early settlement on the North American continent. It seems quite safe to assume that had Cobalt been found in 1686 the attention of the Old World would have focused with great intensity upon this region. It is not unreasonable to suppose that the tide of immigration to North America would have been in this particular direction. It is probable that bitter jealousies would have grown in the breasts of those who were blazing the western trails for France and those who were steering the destiny of Anglo-Saxon influence in the New World.

It is one of the marvels of the opening of Northern Canada that for more than two centuries, white men, armed with all the inquisitive instinct of the race, should have trekked along Lake Temiskaming, camped upon its shores and failed to receive any intimation from their fellows or from the natives of the rich silver veins lying in the very shadow of their camps.

But, to turn again to the history and romance of the Wright Mine: The following are notes as taken from the Commander's diary, dating from May 12 to May 24, 1686, the date on which the lead deposit was found:

The Diary of Sieur De Troyes.

On May 12th.... We reached "Mattawan" which signifies in Indian language "Fork of Rivers": one being at a point that the left is to the South, and the road of Ottawa's to the right, which is North. Consequently my road leads me to Temiskamingue. I arrived at this place of Mattawan very early; this gave an opportunity to the Rev. Father Sylvie to celebrate Holy Mass. We were at a point where the Indians were camped, and were making canoes. They seemed to be greatly surprised to see such a lot of people. It had snowed in the morning, but the evening was very nice: I had dined with Sieur Juchereau that came from Michilmakina, and was going to Quebecq in great hurry, to bring news to Monsieur le Marquis de Denonville. He had arrived as I was having dinner, and continued his journey shortly afterwards, to gain time on his route. In the same time I ordered Sieur de St. Helene with three of our canoes to go and meet Mr. d'Hyberville.

On May 1th.... It rained, snowed and strong wind all day; also continued the next day till noon. Monsieur d'Hyberville arrived, and told me he had uselessly waited for two days for the canoe I had made him wait for.

I was very suspicious of the Indians: consequently, in order to keep my staff on the watch, I had ordered that nobody on the guard should sleep, and on the first alarm, they were to put out a small fire, and in one word, everybody was ready and in order, the arm in hand.

I got a cross erected on the point of the Fork, and our English interpreter opened his leg to the bone with a stroke of the axe. We count from the Island of Montreal to Mattawan: one hundred leagues (or 250 miles).

On May 15th.... We could not start before sunrise on account of portaging we had to do in water which was extremely cold. We left after Mass was celebrated, and having made three portages, we camped one league higher than the first, and three and one half from Mattawan. One of our canoes was broken in pieces in the second portage. Having landed in a rapid, we saved the contents, but we got some of the staff hurt. I got in the canoe of the Captain of our Guides, an Indian that knew the road of the "Bay" perfectly well. I hired him in Mattawan.

On May 16th.... We were camped eight leagues from Mattawan, one league above the fourth portage. The road is very bad and for three hundred feet long, Sieur de St. Helene was dragging.

On the 17th.... We went up again and the place that we name "The Long of the Soo". It is two leagues long and is extremely difficult on account of its great current. We had to pole it nearly all the way, and dragged it in five or six different places. We got some canoes damaged and we camped above the last rapid.

On the 18th.... We left in the morning, and left although there was a big storm that lasted very well near all day. Arrived at the house of Messrs. The Company of the North. This company is on an island of lake Temiskamingue: it may have one half a league of circumference and between two rapids proceeding from a little river called "Matabec Chouan" in Indian, from which some Indians come out to trade. There was fourteen Frenchmen in this house for the Company that were as joyful as we were of our arrival, that we celebrated from parts and others by several shots of guns.

On the 19th.... And the two following days, the weather was very unfavorable. Messieurs de Ste. Helene and d'Hyberville employed with Monsieur de St. Germain business of the Old and New Company, and furs that was in the store where they appointed Sieur Sibille to render accounts of all to the Company. We left him four men to make the trade with very little provisions. Sieurs Guillet and Villedieu stayed for three days at Nipissingue, Savage Nation, to get canoes made and to bring them to Montreal, as for us, we traded with the Indians that were close to our house to replace the ones we had and that we had left there on account of them being too large and too heavy for the balance of our journey. I was very careful to put two good canoe men for every canoe, in order to jump the rapids.

On the 22nd.... It rained a part of the day: this did not stop us from going after celebration of Mass, followed by three canoes to go and visit a mine at six leagues from the house. I gave orders to Sieur de Ste. Helene that I left, to settle the affairs and to join me the next day with the balance of the staff, and to keep in the Lake the route of the North, to facilitaate his joining me. Two leagues from the house, I met three Indian camps that traded a small canoe of four places with me, that I made use of the balance of my journey and for my route to Quebecq. I camped from there on an Island: weather not permitting me to go further.

On May 23rd.... After Mass, we walked to search the mine. The man named Coignac guided us. We met in our search an Indian camp that the people the previous day had killed a big Moose. This gave me an opportunity to camp close to them, and in order that Coignac would find the mine easier. He looked for it uselessly the balance of the day; during this time, the two lieutenants left the house to join me with all our staff, but a big storm separated them, ones took the South and others took the North. One part got on Islands, this was the cause of very few joined me.

On May 24th.... A very heavy wind all day accompanied by rain: but Cognac that had renewed his memory assured me that he recognized himself and that the mine was very close. I got in canoe with him: I paddling in bow and he steered, and did not quit our search, although the weather was very bad to go to the place where Cognac thought the mine was. We found it, indeed this mine is situated to the East and West on the borders of the Lake. West of a rock in form of a half circle that has fifty feet on the edge of the water, ten feet high from the level of the water and one hundred feet deep, having no earth on it and losing itself under a mountain covered with rock. We extracted a few small pieces with great difficulty and returned to the Camp.

Time of the Re-Discovery.

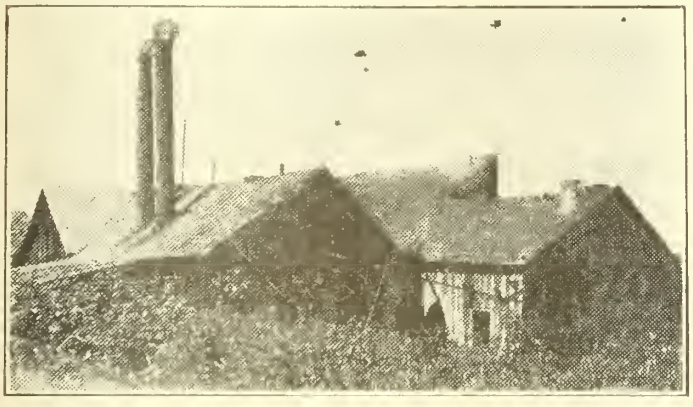
There are no illustrations or drawings in existence which deal with the mine as it appeared more than two centuries ago. Indeed, there is but meagre mention made of the deposit until about 1850. It was about this date that Mr. E. V. Wright of Ottawa, who owned the timber in this locality, re-discovered the deposit.

Wright was engaged in removing timber from his concession, when the calks on his boots chipped off some of the galena and lead-bearing ore. Samples of the ore were taken to Ottawa where they lay for several years on the desk of the discoverer. About 1870, it occurred to Wright to have the samples assayed. The result of the assay was such as to arouse considerable interest. Shortly after this, Mr. Wright, accompanied by J. M. Currier and Mr. Eustis from Boston came up and commenced work, sinking a shaft to a dtpth of about 12 feet. From this shaft, they took out about ten tons of ore. Details of the result are lacking. It is recorded, however, that a second shipment was made by raft, but the crude conveyance smashed up in a mad plunge through the rapids at Deaux Riviers.

Nothing was done until 1885, when George Goodwin, of Ottawa, together with G. T. Bropy advanced sufficient money to pay for sinking the shaft a further 50 feet in depth, as well as installing some mechanical equipment and a five-ton stamp mill. This plant was afterwards burned. No ore was shipped as a result of this work.

About 1890, Robert Chapin, at that time president of the Ingersoll Rock Drill Company, (N.Y.), bought the property and made an option payment on the basis of 125,000. He installed the first air compressor in the country, and built a fifty or sixty ton mill. He continued the shaft to a depth of 250 feet, and did considerable lateral work. This resulted in the shipment of a considerable quantity of concentrates, the value of which seems to be impossible to ascertain at this date. It is said that Mr. Chapin became involved in some bad investments which caused him to abandon this mining project with the result that the property reverted to Wright, the principal holder.

In 1895, Wright sold the property to the Petroleum Oil Trust, of London, England. The new owners sunk



The old Wright Mill.

the shaft another 50 feet in depth and did several hundred feet of drifting and cross-cutting at the bottom level, as well as some work at the 250-ft. level. The mill was also operated, the concentrates being shipped to Swansea, Wales. No figures are available as to the amount of concentrates produced.

The mill and buildings as erected by the Petroleum Oil Trust are still standing, although the machinery has been pretty well all removed. The writer visited the mine, June 18, 1921, together with the members of the Ontario Mining Association who were being entertained by the Temiskaming Mine Managers' Association. The four views presented with this article were taken at that time. Unfortunately, a fifth picture, showing the style of bunkhouses, etc., is too poor to reproduce. These buildings are of the old-fashioned type, features being the many gables as well as having a ground-floor entrance and a second story entrance by stairways leading from the ground.

A few years ago ,the Wright Mine was bought by the Timmins-McMartin interests of Montreal, and is still owned by them. The underground workings are filled with water; the plant is completely dismantled, and the visitor finds difficulty in throwing off a feeling of peculiar sadness as he views this neglected strange link between Canada of the present day and that wild land of 235 years ago, long before Wolfe took Quebec, and even dating back nearly a year before La Salle, greatest perhaps of the French pioneers to North America. It was in 1682 that history tells us that in the name France, La Salle took possession of all Louisiana, from the mouth of the Ohio to the Gulf of Mexico in a resounding proclamation handed down to us. On the column was inscribed "Louis le Grand, Roy de France et de Navarre, regne; le neuvieme Avril, 1682." It was just four years later that the Wright mine was found, thus linking itself with a past about which only a little is known and which occupies but a dim place in the minds of men.

SILVER ISLET MINE.

J. J. O'CONNOR, Port Arthur.

Developments at Silver Islet continue to be of the most encouraging kind. The drift that is being driven from the old fourth level, along the graphitic portion of the Macfarlane dyke, is now in 350 feet. On August 1st, a calcite stringer, carrying pyrites was encountered in the face of the drift, other stringers were met with, carrying galena, zinc-blands and pyrites. The drift is now in a bunch of calcite stringers, aggregating about six feet in width, carrying the above national materials, together with silver, being the first silver to be encountered in the new workings.

While this aggregation of stringers does not amount to a vein, the fact that the ground covered by them is well mineralized, and carries silver, is highly significant, when the further fact is noted that it was in just such ground that the high silver values were met with in the old workings, and not in the more defined portions of the vein. It would seem that the expectations of the Islet Exploration Company, are about to be verified, and that when the great fault is met with at the intersection of the Burnt Island vein, good silver values are almost assured. This drift is to be continued for at least 1,200 feet, or until it cuts the other known value, of which there are, at least two.

The shaft at Edwards Island, nine miles east of Silver Islet, is still in massive arsenical silver, at a depth of 50 feet, there being no change from the surface. The Islet Exploration Company will continue the sinking on this vein to a suitable point, before drifting is commenced.

Dr. Tanton, of the Geological Survey, Mines Branch, Ottawa, has spent part of three Summers covering the coast line in the vicinity of Silver Islet. He has located a vein on Marvin Island, situate about two miles west of Silver Islet, carrying high percentages of nickel. He is now operating in the Loon Lake area 27 miles east of Port Arthur.

THE GRAPHITE INDUSTRY.

The production of graphite in Canada and the United States has not been a source of large profits to the operators and some of the American producers are now urging that import duties be imposed to assist producers in competing with foreign products. In an article reviewing conditions in the industry, Mr. C. L. Miller urges in "Engineering and Mining Journal", Aug. 6, that a more promising plan is to perfect the refining and concentrating methods and so reduce costs that competition with foreign products is not detrimental. He states that while the graphite industry in the United States is at present in a demoralized condition, it is not hopeless, marketing has been haphazard and few attempts have been made to systematize it. Lack of uniformity in product and irregularity of supply has made it difficult for manufacturers to deal directly with producers.

Northern Ontario Letter

THE SILVER MINES.

The Cobalt Field.

Without including the premium on United States funds, the silver-mining companies of Cobalt received an average of approximately 61 cents an ounce for the silver produced during the month of July.

The Nipissing, Mining Corporation, Coniagas and O'Brien produced an aggregate close to 700,000 ounces during the period, according to preliminary estimates, while the La Rose Consolidated, Bailey Silver Mines and Chambers-Ferland continued to produce at a moderate rate, bringing the monthly output up to close to three quarters of a million ounces with an estimated value of about $450,000 from the Cobalt field for the 31 day period.

Following the official statement in the Journal that milling operations were to be resumed on the Hudson Bay Mines, as well as the information that underground work is again under way on the Violet mine of the La Rose Consolidated, various rumors have been rife in Cobalt in respect to some of the other closed down mines being reopened within a short time. Of these, the McKinley-Darragh, Beaver Consolidated and Temiskaming are the three more important properties, but the rumors about any one of them re-opening shortly appear to have originated on the street. Those in close touch with the mining situation believe some further adjustment in costs of material as well as labor will be awaited before a general movement toward re-opening all the mines of the camp may be expected.

Production from the Nipissing mine is steadily increasing, according to the regular monthly statements issued by Hugh Park, manager, a feature being the large amount of cobalt produced as a by-product. Following is the July statement:—

"During the month of July, the Nipissing mined ore of an estimated net value of $166,363 including cobalt to the value of $25,380, and shipped bullion from Nipissing and customs ores of an estimated net value of $223,057. The value of the silver production was estimated at 61 cents per ounce.

"There were no underground developments of great importance during the month. Development work on some small veins was generally satisfactory. Stoping operations were also encouraging. No new veins were discovered by exploration.

"The low-grade mill treated 7,258 tons. The high grade plant treated 185 tons, and the refinery shipped 370,117 fine ounces of bullion.

The value of ore mined in July compares with $162,824 in June and $142,036 in May.

During the second week in August the O'Brien mine shipped 64,000 pounds of ore, this being the only ore sent out from Cobalt during the period.

The shaft on the Waldman property of the Oxford-Cobalt continues to show favorable results. Two small veins occur in a wide fracture, and a substantial tonnage of medium-grade ore is being placed in sight. The stringers themselves are composed of calcite and smaltite, with silver values ranging from a few ounces to as high as 1,000 ounces to the ton. The shaft is down about 48 feet and is expected to reach contact with the underlying diabase at a depth of about 75 feet.

Elk Lake and Gowganda.

Plans for operating the Castle property of the Trethewey Company in Gowganda are being held in abeyance pending the outcome of the projected light, narrow-gauge railway. The company will erect a mill on the property just as soon as transportation and other conditions appear to warrant such a step.

Messrs Hartley and Wescott, discoverers and owners of a high-grade deposit of iron ore in the townships of Yarrow and Morel, about 20 miles north-west of Elk Lake are in Cobalt this week. They were interviewed on the outlook on their property and expressed genuine optimism over results to date. Among other things, it was stated that the surveying of nine mining claims of their own had been completed while two others belonging to another prospector have also been surveyed.

Mr. Wescott states that basing his opinion upon twenty years' experience in connection with iron mining in Michigan and Wisconsin along the Lake Superior Range, he is entirely confident that in their new discovery they have a deposit of big importance. Both Mr. Hartley and Mr. Wescott were pleased about the report which came this week from Sault Ste Marie that a deposit of hematite has been discovered by Col. J. A. Currie at a point about 67 miles north of Spragge, as this lies exactly in a straight line between the great iron ranges along the south shore of Lake Superior and the discoveries made this Summer in the Elk Lake district.

As regards the projected light, narrow-gauge railway for the outlying mining camps, including Gowganda, West Shining Tree, Fort Matachewan, Kirkland Lake and Larder Lake, it is learned by the "Journal" that the promoters of the scheme have completed the sale of bonds to a certain bond house which will proceed with the re-sale of the bonds, agreeing to make a weekly payment to the railway company. It is now the plan of the Northern Light Railway Company to place engineers in the field this week with a view toward commencing construction early in September. Construction work will be carried on both east and west from Swastika, and it is believed the line will be in operation as far east as Victoria Lake before Winter sets in, while it is also hoped to have the line well on its way toward Fort Matachewan by that time. Among other things, an excellent townsite has been located on the shore of Victoria Lake. This encouraging prospect of actual construction of the line holds out promise of greatly benefiting the entire Kirkland Lake area, passing as it will from one end of the field to the other. Its completion through the Gowganda silver area is indicated for the following Summer.

During the week of Aug. 12, the O'Brien mine shipped one car containing approximately 64,000 pounds of ore. No other companies appear on the shipping list for the period.

During the corresponding period, the Nipissing mine sent out two shipments of bullion, making up an aggregate of 74 bars containing 100,725 ounces of silver.

THE GOLD MINES.

The Porcupine Field.

At no previous time in the history of gold mining in Ontario has production been so heavy as at present, and, at no previous time since the industry became established as one of importance has there appeared to be less excitement.

The rising tide of unemployment in certain of the larger industrial centres of Canada and the United States, and the steady increase in competition among the manufacturers who are bidding for the business of

supplying material to the mines is creating a condition which is believed to mean more to the gold mines of Northern Ontario than the general public realises. Indeed, right at the mines, only the careful observers are able to grasp the full significance of the situation.

A dollar now paid to a miner gets a much greater amount of work in return than was the case when a shortage of labor caused low efficiency; a dollar now paid for material buys considerably more than it did a year ago—but, in the meantime, the standard value of gold remains, and each ounce spreads over a greater amount of the cost incurred, thereby leaving a steady increase in the margin of net profit.

The secretary of the Dome Mines has sent out information to stockholders in the United States pointing out that the Canadian Government makes a pracice of taxing only 50 per cent. of the amount of dividends paid by gold and silver mining companies in this country, it being the intention of the government to allow the remaining 50 percent to take the form of capital return. The stockholders of the Dome who are resident in the United States are advised to draw this matter to the attention of authorities in the States and thereby gain the exemption to which they are entitled.

Arrangements have been made by the March Gold Mines, in Deloro township, to commence operations, and toward this end and arrangement has been made with the Coniagas Company to use the mining plant on the Maidens-MacDonald property which is owned by the Coniagas.

It is probable that the construction work decided upon at the McIntyre-Porcupine mine will consist of the erection on an entirely new milling-unit of about 550 tons of ore daily on the north side of Peary Lake, situated close to the main hoisting shaft. The completion of this new plant may then be following by the removal of the present 550 ton plant to the same building in which the new equipment will be housed. At least this is the question which the officials are now dealing with, the alternative being to merely instal grinding equipment on the north side of lake and then ship the pulp across the lake to be treated in the present mill. Everything considered, and looking far into the future, the scheme to build an entirely new unit, followed by the removal of the present equipment to the same building, seems to have many advantages, and this has given rise to the belief that it will probably be in this manner that the McIntyre will increase its capacity to over 1,000 tons of ore daily. With respect to dealing with graphite which occurs in certain parts of the McIntyre mine in close association with the gold, it is learned that a solution of metallurgical difficulties has been found but, for adequate reasons, the details of the process are temporarily withheld. The result of experiments together with actual demonstration of production and the definite decision to double the capacity of the mill combine to assure the McIntyre of production amounting to between $3,000,000 and $3,500,000 annually. As regards the date of completing the new addition, it is learned that foundations and construction work will be completed this year so as to proceed with the installation of milling equipment during the winter months.

The shaft on the property of the Union Mining Corporation, situated in the township of Whitesides, has reached a depth of 250 feet, and is being continued to a depth of 300 feet. In the meantime, a cross-cut has been driven at the 150-ft. level and has encountered a vein about 8 feet in width in which encouraging gold values are reported, although no official announcement has been made as regards the average gold content.

The Ontario Government is stated to have set aside $10,000 with which to improve the 25-mile road from Timmins to the property.

Diamond drilling operations have been commenced on the Gold Island property, on Night Hawk Lake. A. R. Globe, a former assistant manager of the Hollinger Consolidated, together with Jack Gallinan are identified with the Gold Island project.

Normal rainfall has been recorded during recent weeks throughout all parts of Northern Ontario, and the prospects of the storage basins being filled so as to provide ample hydro-electric power for the mines during the winter months are good.

Kirkland Lake Area.

For the six months ended May 31st, the Lake Shore Mines realized net profits of $30,486, according to a half-yearly statement just issued. The issuance of a half-yearly report is a new departure for the Lake Shore, the company having heretofore issued a brief monthly statement of gross output and amount of work done, in addition, of course, to the annual report. The Lake Shore assets are given as $1,349,474 as compared with $1,369,463 at November 30th 1920. Results now obtaining at the mine are better than during the period under review and the net profit for the six months to end Nov. 30th, 1921, promises to exceed that of the first half of the fiscal year.

Surface work is well under way on the property of the Lebel Lode, in Lebel township. Cross-trenching is being done on a fractured zone which appears to be about 300 feet in width and in which a number of veins occur. Officials of the company believe this to be the easterly continuation of the main fracture and ore-bearing zone which passes through the productive section of the Kirkland Lake field.

In all parts of the Kirkland Lake district, considerable attention is being turned to the favorable prospects of the projected light, narrow-gauge railway being constructed this fall right through the heart of the field.

What promises to be an important gold discovery has been made in the Lightning River district, on property belonging to the Lightning River Gold Mines. Gold occurs in spectacular quantities in a vein measuring from three to four feet in width, and over a length of about 200 feet.

The Matachewan Gold Mines, Ltd., is considering the advisability of resuming operations this fall. The company recently purchased a number of additional mining claims, lying adjacent to its main property on the south. The latest purchase was claim No. 5401 this being one of a group which is known as the Robb-Clemens property.

It is reported unofficially from Elk Lake that the Dominion Government is considering the question of improving transportation facilities to the Fort Matachewan district. The plan being considered is the erection of two dams, one at Indian Chutes and one at Fox Rapids, and in that way to enable boats to operate between the railhead at Elk Lake and the Fort Matachewan district, with only two short portages. It is pointed out that such dams would have the added advantage of developing water-power to yield about 10,000 h.p. of electric current.

TORONTO MINING QUOTATIONS.

Quotations on Active Stock on Standard Stock Exchange on August 17, 1921.

Silver	Ask	Bid.
Adanac Silver Mines, Ltd.	....	1⅛
Beaver Consolidated	26½	28¼
Coniagas	1.60	....
Crown Reserve	10	8
Foster	3	1
Mining Corp. of Can.	1.15	1.10
Temiskaming	....	22
Trethewey	13	10½
Gold.		
Atlas	21½	21
Dome Lake	7½	7
Dome Mines	19.00	....
Hollinger Cons.	7.11	7.10
Keora	10	8¼
Kirkland Lake	38	37½
Lake Shore M. Ltd.	1.25	1.21
McIntyre	1.99	1.97
Moneta	12	11
Porcupine Crown	14½	14¼
Porcupine V. N. T.	17	16¼
Preston East Dome	3	2
Schumacher	21	20
Teck-Hughes	15½	15¼
Thompson Krist	5½	4
West Dome	7¾	7⅛
Oils		
Petrol Oil	23	20
Rockwood Oil, Gas	1¼	1
Vacuum G.	5	4

METAL QUOTATIONS.

Following are the fair average prices for ingot metals (in less than car-loads):

Montreal.	Cents per lb. Aug. 10th.	Aug. 17th.
Copper, electric	17¼	17¼
Copper, casting	17	17
Tin	35	33
Lead	6½	6¼
Zinc	7	7
Aluminum	29	29
Antimony	7	7

METAL QUOTATIONS

Toronto	Aug. 10th.	Aug. 17th.
Copper, Electric	17	17
Copper, Casting	16¾	16¾
Tin	35	35
Lead	6¾	6½
Zinc	7	7
Aluminum	28	28
Antimony	9	9

IRON ORE DISCOVERY REPORTED.

It is reported from Sault Ste. Marie than a large deposit of hematite has been located 67 miles north of Spragge and about 100 miles from Sault Ste. Marie. Col. J. A. Currie and Mr. A. M. Campbell are the locators. The elaims are 35 miles from railroad.

It is stated that the iron deposit was first noted in 1857 by the Herrick survey expedition. An attempt was made to find the deposit in 1903, but it was not found and the project was abandoned until recently.

British Columbia Letter

Metal Mines.

Dawson Y.T.: The Coeur d'Alene Mines of Idaho are reported to have secured options on three large groups of claims in the Keno Hill District of the Mayor Camp.

Stewart B.C.: The Fish Creek Mining Company are doing substantial development on their claims, situated in the Salmon River section about a mile, as the crow flies, from the Hyder-Premier road. A promising vein of ore is reported to have been uncovered through the blasting necessitated in laying the foundations for one of the towers of the Premier Mine's aerial tramway.

Prince Rupert B.C.: George Clothier, resident mining engineer, recently made a trip into the Atlin District and reports that the discovery of some placer gold in the Little Atlin Lake section caused a stampede recently from a number of local centres. Subsequent developments proved that there was no occasion for excitement. There are more men on the long-exploited creeks of Atlin than for the past two or three years. Individual miners are making good wages and there have been several fair cleanups. The smaller creeks now are beginning to show up well. As to lode mining the inactivity of the Engineer Mine, because of litigatio, is holding back progress. Wth the opening of this property Mr. Clothier looks for general mining improvement. A substantial mining company has optioned J. N. Ruffner's Group of Claims on Fourth of July Creek, on which there are good surface showings of silver-lead ore.

Greenwood B.C.: The water rights acquired 15 years ago by the Granby Consolidated Mining & Smelting Co. on the Columbia River at Kettle Falls have been sold. Having ceased its mining operations at Greenwood and Phoenix the Company has no further use for these holdings.

Trail B.C.: Receipts at the Trail Smelter of the Canadian Consolidated Mining & Smelting Co. for the last ten days of the month of July totalled 12,761 tons. Of this 12,196 tons were from the Company's properties, 231 tons from the Surprise Mine of the Republic Camp, and 34 from the Sally Mine at Beaverdell.

Revelstoke B.C.: The largest deposit of hematite from ore known in British Columbia occurs on Fenwick Mountain, East Kootenay, within five miles of Wardner and nine of Jaffray (both stations on the Crow's Nest branch of the Canadian Pacific Railway), and within fifteen miles of Elko where the Great Northern Railway is operating its line from the Fernie and Michel coal fields to Rexford, Montana.

The property derives its name from Bull River which runs at the foot of Fenwick Mountain; and consists of eight elaims of about 50 acres each embracing all the surface exposures of hematite on the summit of the mountain.

The eight elaims are held in fee simple having been Crown granted.

The general structure of the iron-bearing zone is a banded one, bands of iron varying in width from two to eight feet, separated by a barren parting of from 6 inches to one foot: the barren partings are sometimes replaced by a low-grade iron ore carrying from 20 to

45 per cent. metallic iron. The bands of iron are continuous in length and width and show no indications of being lenses or pockets.

About $8000.00 has been spent in running tunnels and stripping the surface. The ore may be divided into three classes as follows: A hard, blue, hematite, slightly schistose in character; and a soft surface-ore.

A series of analyses taken from all the claims resulted in an average of 8.52 per cent. residue, 8.58 per cent. alumina, 1.56 per cent. lime, 1.10 per cent. magnesia, 0.062 per cent. sulphur, 0.0282 phosphorus and 61.35 per cent. metallic iron.

Sufficient development work has not been done to estimate the amount of ore, but enough has been done to prove the surface area of the iron-bearing formation or veins both as to length and width.

A spring and a small lake on the claims furnish enough water for domestic purposes. There is a sufficient supply of timber for mining purposes.

The development work done on the claims has defined the course and dip of the deposits but no attempt has been made to determine the depth to which these deposits extend. This could be cheaply and quickly done by means of a diamond drill. Judging from the outcroppings of the ore the lowest to the highest points exposed measuring 900 feet, it is probable these deposits will be found to continue with depths. The contour of the mountain is such that the deposits could be worked to advantage by the open-cut method.

In a report prepared for the B.C. Dept. of Mines, the Resident Mining Engineer for East Kootenay, Mr. A. G. Langley, says of the well known Sand Creek iron property as follows:

Preliminary exploration has disclosed a vein of hematite running in a north-westerly direction along the south side of Sand Creek. Three claims have been staked along the strike of the vein and are known as the Pearson group, being owned and staked by the present owner, W. Pearson.

Leaving the Fernie road at Jaffray it is possible to drive by motor within six miles of the property. A good trail is then followed up the creek. The claims are easily accessible and a road-grade of not exceeding 3 per cent. is obtainable from Galloway to a point on the creek immediately below the exposures, which are situated at an elevation of from 400 feet to 600 feet above.

The valley of Sand Creek in this vicinity is a beautifully wooded country of timber, principally represented being white pine, hemlock and cedar. On account of the rock outcroppings being covered with overburden, it is only possible to form a very limited idea of the geological structure, or the formation, which apparently consists of quartzites, probably belonging to Cambrian age, and having a dip of 50 degrees to the south-west and a strike of N. 50 degrees W.

The ore, consisting of a massive red hematite, occurs as a bedded fissure-vein replacing the quartzites. The hanging wall is well defined, but on the footwall side the ground is broken and crushed, and in places stained with the characteristic red color of the ore.

At the most southerly working, at an elevation of 4000 feet, a deep open-cut crosses the strike of the vein and terminates in a short tunnel. Here the formation seems to be broken over and the ore, which is more or less crushed, does not appear to be in place, but to have slid over from a higher point up the hill. The ore shows the width of 3.5 feet of a massive red hematite, a sample across which ran: Metallic iron, 51 per cent.; silica, 22 per cent. phosphorus, nil; sulphur, nil.

At a slope distance of approximately 120 feet above this showing a diamond-drill hole was put down by Dr. Ings, of Calgary, some years ago, but no record of work is available except that the results were not encouraging to him. At an elevation of 4000 feet, and at an approximate distance of 300 feet to the northwest, a short tunnel was driven on the vein and a small tonnage of hematite extracted. The ground here is broken at the surface and the tunnel is not of much consequence except to show the persistency of the vein.

Continuing along the side-hill for a distance of about 300 feet, the northerly workings are reached. Here at an elevation of 4,300 feet a short-cut shows a section of the vein to be in-place. The dip, conforming to that of the enclosing strata, is 50 degrees to the south-west and strikes about N. 50 degrees W. The hanging wall of the quartzite is well-defined and there is a good selvage between it and the ore. On the foot-wall side adjacent to the ore, there is a band of about two feet talcose material, and general conditions would indicate that the country-rock has undergone more crushing and alteration on this side of the vein.

The ore is a well-defined band of red hematite lying next to the hanging-wall and having a width of 12 inches, across which a sample ran as follows: Metallic iron, 57.4 per cent.; silica, 15.6 per cent.; phosphorus, nil; sulphur, nil. Although the samples taken show the ore to run rather high in silica, it is undoubtedly of good grade and should a good workable width be developed the mining costs for this class of ore should not exceed $2.00 per ton.

The hillside, sloping at an angle of 30 degrees, affords a number of good tunnel sites, and a depth of 400 feet on the vein could be obtained by cross-cutting from the surface. There is a good camp site with plenty of timber and water, while power might be developed from Sand Creek, which has a flow of about 4 second-feet during the dry season.

It is not unlikely that there may be other parallel veins in this formation, and although the vein is small the good quality of the ore and the easy accessibility of the property are strong factors in its favor, while the possibilities from a geological standpoint appear to warrant further work being done to prove the existence of a sufficient body of ore to be of economical importance.

The preliminary work should consist of trenching and open-cuts along the strike of the vein; then if the results are favorable, a diamond drill might be employed to advantage.

COAL MINES.

British Columbia will be represented at the International Conference to be held on September 1st and 2nd at St. Louis, Mo., under the auspices of the United States Bureau of Mines, for the purpose of discussing the possible standardization and improvement of mine-rescue methods. Robert Strachan, senior mine inspector, headquarters at Fernie, has been chosen to attend on behalf of the Province. As the Hon. Wm. Sloan, Minister of Mines, has been unable to arrange to be present in person Mr. Strachan will read a paper by Mr. Sloan on "The Need of Standardization in Mine Rescue Work." The Province also will have representatives entered in the International First Aid and Mine Rescue Contest for 1921 which takes place from the

1st to the 3rd of September at St. Louis. Arrangements have been made to send to St. Louis the Nanaimo First Aid Team, captained by Mr. W. Barton, who hold the Montizambert Cup, representing the Canadian championship.

The Harewood Mine of the Western Fuel Corporation of Canada, Nanaimo B.C., has been re-opened. It has been idle for some time. The company, however, is reported to have secured contracts that necessitate an increased output. Consequently, not only the Harewood, but the Wakesiah, Reserve and No. 1 Mines must be worked to their capacity.

The Crow's Nest Pass Collieries have been suffering from the widespread depression affecting the coal trade everywhere. The Coal Creek mines worked seventeen days in July. At Michel the mines worked sixteen days and at Corbin only seven. At Coal Creek a large Sirocco fan is being installed. This improvement, including the sinking of a shaft 40 feet deep, 16 feet in diameter and lined with concrete down to the solid rock, represents a considerable outlay. Undoubtedly, however, it will make No. 1 East one of the best ventilated mines in the Province and permit it to assume, in a very short time, if not first, at least second place among the heaviest producers. No definite plan has ben decided upon as to the form of power to be used in driving the new fan. A powerful steam engine is available and, if necessary, can be used. The Alberta & N. C. Power Co., however, is developing the Bull Rivet water power and its installation may be so nearly complete in the course of a few months that the whole south side of the Coal Creek Colliery will be electrified. The present auxiliary steam plant, running No. 3 and No. 1 East fans, in such a case, would be kept in reserve to meet emergencies and the load on the main plant would be relieved to the extent of the power now supplied to No. 1 South fan. Moreover this would mean the saving of quite a few tons of coal of excellent quality now being burned daily under these boilers.

Washington State coal mines, it is reported, will be opened immediately on a closed-shop basis. They have been inactive since March 15. Representatives of the United Mine Workers of America, who have held a convention at Seattle Wn., stated that they would refuse to arbitrate with he employers on the proposal of reducing wages at present. The operators declare that they will not deviate from the Allport Report, recently published, which recommends substantial wage reductions.

Victoria B.C.: The Canadian Geological Survey Branch, Ottawa, has issued a series of maps and diagrams entitled "The Fraser River Investigation Series." The first two of these deal with the float observations of W. A. Johnson in 1919. The third indicates the distribution of surface deposits within the Fraser River Delta. The Ladner and Lulu Island, and adjacent sections, are made up of peat bogs and alluvial deposits while the sites of the cities of New Westminster and Vancouver are glacial till and fluvio-glacial deposits, overlain in places by small thicknesses of marine deposits. The rise and fall of the Fraser River over a period of from fifteen to twenty years is pictured by chart. The highest recorded rise was in 1894 when it reached 25.9 feet. In 1920 the records show that it came to the 21 foot level. An interesting diagram is that marking the gradual change in the river channels between the years 1827 and 1920 and also that portraying the seaward advance of the river delta.

COOLING DEEP WORKINGS.

A refrigeration plant is now in operation at the Morro Velho gold mine in Brazil, cooling the air supplied to the deep levels. At this mine the high temperature has seriously interfered with mining operations and made development work almost impossible at the lowest levels. The driving of a tunnel at the lowest level, at a depth of 6,426 ft., was accomplished with great difficulty and it is unlikely that deeper mining would have been attempted had not the management made arrangements for chilling the air. It is understood that the refrigeration plant will make it possible to continue the use of the present mining plant to a depth of 7,500 ft. Before the cooling plant was installed the heat was sufficient to interfere with the electric motors driving the fans and working conditions were becoming impossible.

The Morro Velho mine is operated by the St. John Del Rey Mining Co. Ltd. At the last annual meeting, held in London June 30, Sir Henry P. Harris reported that the main lode had been cut at the lowest level and found to be satisfactory there. During recent years the ore mined has shown a considerable increase in value. Ore mined during the year ending February 28 1921 averaged 57s. 7¾d. and the cost per ton averaged 47s. 11½d. The profit on the years operations was £167,749.

BOOK REVIEW.

CONCENTRATION BY FLOTATION. T. A. Rickard, 6 by 9 inches. Cloth Boards. 692 pp. with Index.

Mr. T. A. Rickard's ability to compile a treatise on flotation methods is so generally admitted, and the treatment of the practice in the latest book is so comprehensive that a critical review will not here be attempted. The book now issued is a collection of articles by various metallurgists that have appeared in "Mining & Scientific Press" of San Francisco during the years 1915 to 1920. Five of the articles were reprinted in Mr. Rickard's earlier book on this subject, published in 1916, entitled "The Flotation Process" and seventeen articles appeared in "Flotation" by T. A. Rickard and O. C. Ralston, published in 1917, both of which are out of print. In the latest volume, eighteen additional articles are included bringing the subject up to date, and making, as the preface states, "a convenient compendium of the principle literature on the technology of the process". Mr. Rickard points out that no book can assume to be complete and final in regard to a process that is still so imperfectly understood and that continues to undergo such radical changes.

A necessary and very interesting fore-page to the treatise is a glossary of flotation. The first chapter, dealing with the history of flotation, is an enthralling one, and indicates that the scientific theories now elaborated in regard to flotation are later in date than the actual birth of the process itself. The root ideas appear to have occurred to a number of individuals at different times, but a workable process, to use Mr. Rickard's phrasing, "has been developed by the patient empiricism of the mill and laboratory."

Mr. Rickard himself writes on the history and principles of flotation, on flotation litigation, and on the flotation of gold and silver mineral. O. C. Ralston, Glenn L. Allen and James M. Hyde deal with the testing of ores for flotation, differential flotation, mechanical development, and the flotation of oxidized ores. The description of flotation practice in varions parts of the world includes that at Broken Hill, Australia, by E. T. Henderson, R. J. Harvey and C. C. Freeman. W. E. Simpson deals with flotation at Cobalt, the article being dated December 1917. The book is well illustrated and well bound and printed.

WILKES-BARRE MEETING OF A. I. M. & M. ENGINEERS.

The Wilkes-Barre meeting of the American Institute of Mining & Metallurgical Engineers, which is to be held from 12th to 15th September promises to be an unusually interesting gathering, and one that is fairly accessible to Canadian engineers leaving in the East.

One of the trips arranged is an automobile visit through the Wyoming Valley, visiting breakers and mine plants. This district is notable for the large capital expenditure of recent years in modernisation of the anthracite mines, and in the substitution of wet breakers for old-fashioned dry breakers. Papers will be read dealing with this development, and with the general electrification of the mines which has been another feature of recent years. The Wyoming Valley mines supply most of the anthracite that comes to Canada, and the field is interesting in that it is a partially exhausted area that has been rejuvenated by the demand for anthracite which is an accompaniment of its growing scarcity. The programme of the anthracite companies embraces conservation methods of a most intensive kind, and the value of anthracite is demonstrated by the working of very thin seams, and by the salvage of the pillars and stumps left by a previous generation. The antiquity of the anthracite mines of the Wyoming Valley and the age of the charters of the operating companies would be respectable even in Europe. The "Journal" is informed that any Canadian engineers who can visit Wilkes-Barre during the meeting will be very welcome, and will see many things fully worth-while.

PERSONALS.

Mr. Archibald M. Campbell who has been for some weeks engaged in exploration work east of Sault Ste. Marie, have returned to Toronto. He located a large iron ore deposit north of Sprague.

Mr. A. G. Burrows of the Department of Mines, has returned to Toronto, owing to serious illness of his daughter.

Mr. H. H. Sutherland who has been for some months in England has returned to Toronto, Mr. Sutherland has been negotiating in London the financing of Davidson Consolidated Mines.

Hon. Harry Mills, Minister of Mines, and Mr. T. F. Sutherland, chief Inspector of Mines of Ontario, recently visited iron mining districts in Minnesota. They also visited some of the iron ore occurrences in Western Ontario.

The American Institute of Mining and Metallurgical Engineers meets at Wilkes-Barre Pa. Sept. 12 to 15. A meeting of the Society of Economic Geologists will be held at the same time and place.

Mr. Charles Millar has returned to Toronto after a visit to the Mackenzie River oil fields. Mr. Millar is interested in oil exploration in the district and also in transportation on the river.

TORONTO COAL PRICES.

Toronto, 17th August.—There is little change to report since last week in the bituminous situation. Slack, due to the scarcity of screenings, still maintains its price firmly. The demand for lump coal is still small. The buying of anthracite, on the other hand, which set in about a couple of weeks ago, is increasing in volume. But, as buyers generally held off from buying for so long, there is a tremendous amount of leeway to make up before Toronto's coal bins will be in anything like other normal seasonal condition. And the same conditions, generally speaking, that exist in this city prevail throughout the Province. The orders that are coming along for anthracite are, in the main, so the coal merchants inform the winter, of fairly good size.

SEPARATION OF SPHALERITE FROM .. FLUORSPAR.

In experiments conducted by the U. S. Bureau of Mines it has been found that copper sulphate can be very advantageously used in separating sphalerite from fluorspar by electrostatic methods. It is supposed that the effect of the sulphate is to form a thin coating of copper sulphide on the sphalerite. The action is rapid in very weak solutions, and consumption of sulphate need not be more than 1¼ lb. per ton of ore. By wet crushing the ore to 10 mesh and concentrating on tables and the copper sulphating and treating electrostatically a fluorspar product averaging 98.7 per cent calcium fluoride was obtained. This high grade product brings a much higher price than ordinary gravel spar.

EDITORIAL

An Instance of Judicious Use of Breathing Apparatus

There has been a sharp division of opinion among mining engineers as to the extent to which oxygen breathing apparatus could be used in the recovery of coal-mines after fires and explosions, and in the recovery of areas which have been sealed off to extinguish mine fires by creation of an atmosphere in the fire area incapable of supporting combustion. It has been held that no considerations of the time taken in recovery warranted the exposure of breathing-apparatus crews to non-respirable atmospheres, and the bringing of fresh air into the sealed-off areas has been accomplished by slow stages solely with the help of so-called "bare-faced" workers. This attitude proceeds doubtless from a thorough distrust of the protection against non-respirable air provided by oxygen breathing-apparatus, and a genuine disbelief in the ability of men equipped with these rather cumbersome devices to perform any large amount of useful physical labour. The attitude is also a natural revulsion against some of the purposeless and danger-fraught expeditions that have been undertaken by "crews" of men wearing oxygen apparatus, which have on too many occasions resulted in the death of the wearers. There is also no doubt that the earlier types of breathing apparatus, like the earlier types of the submarine and the airplane, were imperfect and dangerous to those who trusted themselves too unreservedly to their protection against conditions which the human organism could not support should the protection, for any reason, momentarily fail.

The earlier forms of oxygen breathing-apparatus have been by this time brought to much perfection, and the use of modern apparatus is not accompanied by such dangers as make their use inadvisable, always provided that the apparatus is in good order, and is used by men physically fit and trained in the wearing and manipulation of the apparatus in non-respirable atmospheres under such conditions are prevail underground. The use of breathing apparatus on a wholesale scale was a feature of the recent war, and the record of occasions under which it has been justifiably and successfully used in connection with mine explosions and underground fires is now so long and undeniable that oxygen breathing-apparatus must be accorded a definite and important place in mine equipment, and more particularly in the equipment of coal-mines.

A recent issue of "Coal Age" contains a description of a mine fire in connection with which oxygen breathing apparatus appear to have been used as they should be used. The article is re-printed in this issue. The rapidity with which the Kathleen Mine was recovered was remarkable, and was made possible by the concrete construction of the mine openings which it was necessary to seal, and by the freedom of the strata from any surface breaks. The experience at the Kathleen Mine strongly recommends the liberal use of concrete and non-combustible building materials in substitution for timber in the construction of shaft-linings and fan-ways. Owing to the general tightness of the seals and the entire exclusion of fresh air from the fire-area, the atmosphere in the sealed-off area speedily showed an analysis that demonstrated the extinction of the fire, and, as the shaft communication and main roadways of the mine were in good order, it was considered proper to send down "helmet-men" into the mine, relying entirely on the protection of the oxygen-apparatus against an atmosphere that would have caused the death of unprotected men in a few seconds. Although the leading of fresh air into the fire area was entirely accomplished by apparatus men in advance, these men were not allowed to go an undue distance ahead of fresh air, and the strictest supervision and checking of their physical condition and the state of the apparatus was maintained throughout the whole operation of recovery.

The recital of this mine-recovery operation by the president and general manager of the company owning the mine in question is a most commendable action, as

it sets forth with full knowledge of all the circumstances a case in which full use was made of breathing-apparatus, mine-air analysis and observations of such barometric and thermometric conditions of the outer atmosphere as might influence the state of the mine air. Breathing apparatus was not used as a "cure-all" or a scientific toy, but under such conditions of precaution and good order as are insisted upon by the submarine commander, the aviator or the diver, and other men who live and work where the unprotected human body cannot live. There is no good reason why mining engineers should deprive themselves of any aid that science can bring them, and before the accumulated weight of useful achievement now standing to the credit of oxygen-breathing devices adapted to mine uses, any purely critical attitude towards the judicious use of these devices should be waived, as the onus of disproof now rests upon those who object to their employment.

There is a very definite feeling in North America that a standardization of breathing apparatus should be undertaken, and conferences to this end are being undertaken during the coming Autumn between representatives of the U. S. Bureau of Mines and the British Columbia Department of Mines. A Committee of the Canadian Institute of Mining and Metallurgy has also reported in favour of standardization, and there is some likelihood that suggestions for closer co-operation between the U. S. Bureau of Mines and Nova Scotia coal companies may result in useful coordination in connection with mine-rescue investigations and some approach at standardization of apparatus. If one type of breathing apparatus were standardized in Canada it would justify the erection of a factory for the manufacture of apparatus and spare parts. It is the difficulty of getting spare parts of the required dimensions quickly that chiefly requires standardization of types. The market for breathing apparatus and accessories is as yet quite limited in Canada, and in Nova Scotia it will never be very large. In Alberta and British Columbia, however, where the possibilities of increase in the number of coal-mines are very great, there will eventually arise a permanent and growing market for mine-rescue and safety appliances in general. Indications are that—as has already been the case with mine machinery and general equipment — the source of supply and the type of material supplied will be western and not strikingly eastern. This tendency, by the way, is one that should attract the attention of manufacturers in Eastern Canada. They have, so far, not made much of a bid for the business of the western coal mines.

THE EDMONTON MEETING OF THE C. I. M. & M.

In this issue will be found the programme of the Edmonton Meeting, arranged for September 14th to 16th. With Mr. Camsell and Mr. Corless in attendance, prepared to talk upon coal, iron and oil, with operating coal-men giving ten minute talks on the coal districts in the West with which they are intimately acquainted, and with Mr. Chappard from the Imperial Oil Company's geological staff to give information on the search for petroleum in Western Canada, this meeting should be as definitive and as epochal as was the Winnipeg meeting on 1920.

It is interesting to note that Mr. Corless, as president of the Institute, is to speak on "Canada's Coal Problem," because it is fairly apparent (and will be more apparent after the meeting) that if any solution to this problem is possible it must come from the West. Sir George Beilby, Director of Fuel Research in Britain, recently said to the Institution of Civil Engineers, "Civilization, on its physical side, is based on fuel". If the responsibility of the West for upholding the Canadian type of civilization is in proportion to its possession of Canada's fuel resources — and we see no escape from the facts— then it is particularly fitting that the president of the Institute should discuss that responsibility at Edmonton, a city situated in the centre of the concentration of Canadian fuel resources which is at once the glory and the heavy responsibility of the people of the West.

ASBESTOS AND INSTITUTE PUBLICATIONS.

The inclusion of Capt. J. G. Ross's paper on the asbestos industry in Quebec in the August bulletin of the Canadian Institute of Mining & Metallurgy is a fair example of the disservice done to the Institute and its contributing members by the delay in publication which occurs through enforcement of the rule that Institute papers must first be published in the "Bulletin" of the annual transactions of the Institute. Capt. Ross's paper was a timely one when it was read, but that is five months ago, and quite a few things have occurred in the meantime. One of the gallant captain's suggestions, namely, that the seller of asbestos should absorb the provincial tax, and that it should not be "rubbed into" the purchaser by surcharge on his bill, has been recently followed, and there are a good many other suggestions made by Capt. Ross that are very much worth the attention of asbestos producers in Canada. Particularly commendable is his advice to asbestos producers to pool their problems by establishing a central bureau for experiment and research. Associations of mine operators in other parts of the world have led to remarkable strides in research in connection with materials of which much more is known than of asbestos, and as will be quickly recognised by those who have seen the recent bulletin of the University of Arizona on asbestos (see page 662 issue 19th August) other producers, in other countries, are not idle.

To revert to the question of publication,—where the papers read before meetings of the Institute are of topical or timely interest, requiring immediate publication and the widest possible distribution among general readers to ensure the publicity and effect upon pub-

lic opinion that is usually the desire of those who contribute such papers, recourse should be had to the technical press, or even to the daily newspapers for purpose of getting quick and wide distribution. We would also point out that a rule which permits immediate publication of *digests* of papers read before the Institute, but forbids verbatim reproduction in the technical press until after the papers appear in the Institute's own publications, is an illogical rule, and it hurts nobody but the Institute and those who present papers at its meetings.

It is also desirable that editorial comment should be made upon papers read before the Institute that warrant such singling out, but if their publication is delayed unduly, such comment savours of the nature of an anachronism. In other words it is "old stuff". The Institute deprives itself of a valuable means of disseminating its news and policies when it virtually prohibits editorial notice of its proceedings by post-dating this to an indefinite tomorrow. We believe the Canadian Mining Institute is now the only scientific body that follows this ancient and musty ruling. Other technical societies, realising that publicity is life and that without it they were better dead, send to the technical press printed and illustrated foreprints of papers to be read, only stipulating that these shall not be released for publication until after the date of the meeting. This, in the case of all but daily papers, means that they are printed a week, or weeks, before the scheduled date of reading. By doing this, technical societies get the widest publicity, they obtain simultaneous editorial consideration and comment, and a concentration of public interest which greatly helps the societies, and also gives some little pleasure to those who have worked for months maybe to write a paper of some merit.

Most persons who present papers to technical societies have something to communicate that is of value. Some perfected individuals, approaching the date of their translation, may write papers with a sole and pure desire to benefit their fellowmen, but most of the unregenerate and decent fellows that compose the membership — of the Canadian Institute for example—like to see their name in print and to hear some comments on their papers, as a reward for good work accomplished; and, such is human frailty, they like to hear it quick and warm after the great occasion of delivery.

Of course, we may be entirely mistaken, and it may be that it is desired that Institute papers should circulate solely among Institute members, constituting an arcanum of professional information, and that publicity should be discouraged. If this is the case, it is only possible to register dissent, and pity that such sentiments should still persist. If, however, it is not the case, as we sincerely believe, then why does not the Institute go after publicity in every conceivable shape and form? There is nothing it lacks more. It has always lacked it.

THE Northern Finance Company, of Montreal, whose advertising of the Pan Extension Gold Mine shares was not of a character calculated to inspire confidence in the financial stability of that enterprise, is now offering through the Montreal newspapers, and by personal canvass of individuals, bonds in well-known German industrial enterprises. A profit of up to two hundred percent is claimed to be possible through investment in these issues. One of the canvassers used as his "approach" to a Montreal city-man the statement that it was necessary the war should be forgotten sooner or later, but made the mistake of adding that one side had been as much to blame as the other in the recent war, with the result that he was asked to get out before he was thrown out. Investment in German bonds, and speculation on the fluctuations of the mark, may or may not prove profitable. For Canadians, however, such transactions are undesirable, if for no other reason than the necessity to provide employment in Canada and to invest Canadian savings in building up this country. There are hundreds of seasoned industrial stocks now purchasable through Canadian stock exchanges that can be bought at the lowest prices of a generation. Canadian bonds, preferred stocks and first mortgages are looking for purchasers, and any reputable broker can advise his clients how to invest savings in Canadian enterprises (and mining enterprises in particular) that should receive the attention of Canadians before the most attractive securities in aniline or electrical companies in Germany. The "ticker" is said to tell the tale, and if German securities are purchasable at low cost it is because those who are in a position to judge have discounted those conditions of political insecurity, war debt, diminished national vigour, diminution of territory, deprivation of natural resources, inflated paper currencies and other consequences that frustrated ambition have laid upon that rather indeterminate territory known as the Republic of Germany. Any transfer of cash for the paper securities so far offered by the Northern Finance Company is, in our opinion, not only undesirable, but indiscreet also.

CANADIAN INSTITUTE OF MINING AND METALLURGY.

PROGRAMME OF ANNUAL WESTERN MEETING.

Edmonton, Alta., Sept. 14th, 15th & 16th, 1921.

Wednesday September 14th.

10 A.M. to Registration and Badges.

12.30 P.M. Address by Minister in charge of Mines.
Welcome from Mayor.
President's Address.
Appointment of Committees.

12.45 P.M. Luncheon.

2.30 P.M. Papers.
"Importance of Coal, Iron and Oil in National Development," by C. Camsell, Deputy Minister of Mines, Ottawa.
"Standardization of Air Drying of Coals" by Edgar Stansfield.

8.00 P.M. Smoker.

Thursday September 15th.

10.00 A.M. Papers.
"Canada's Coal Problem" by C. V. Corless.
Ten minute talks on the Coal Fields of Alberta as follows:—
"Brule and Pocahontas District" by W. G. Healey.
"Crow's Nest Pass District" by W. Stevenson, Jr.
"Drumheller District" by D. A. Macaulay.
"Lethbridge-Taber District" by Moses Johnson.

12.45 P.M. Luncheon.

2.20 P.M. Papers.
Ten minutes Coal Fields Talks continued:—
"Canmore-Bankhead" by L. Stockett.
"Edmonton-Clover Bar" by L. C. Stevens.
"Alberta Coal Branch" by L. E. Drummond.
"Dominion Mining Legislation" discussion lead by Messrs. W. D. Craig, N. C. Pitcher and Dr. John Allan.

8.00 P.M. C. I. M. & M. Banquet.

Friday, September 16th.

10.00 A.M. Papers.
"Recent Development Work Relating to Petroleum in Western Canada" by George Sheppard, Geologist, Imperial Oil Company.
Resolutions.

12.45 P.M. Luncheon at University.
Visit to University.
Meeting of Council.

9.00 P.M. Train to Alberta Coal Branch, visiting Oliphant Munson Collieries, Cadomin Coal Co. Ltd., and others, on Saturday, September 17th.

BOOK REVIEW.

GEOLOGY OF THE BRITISH EMPIRE. Dr. F. R. C. Reed. 6 by 8 1½ inches. Cloth Boards. 480 pp. with Index, twelve folding maps, and thirteen other maps and sections. Edward Arnould, London. Price 40 shillings.

Dr. Reed's book is a monument of geological erudition and a fine example of concentration into small space of the work of many labourers in many and distant lands. The geology of every portion of the British Empire (except the British Isles themselves) is described in this work, and, if the work is as accurate in regard to the other lands included as it is in dealing with Canada, it forms a truly valuable compendium. There is no touch of propaganda in the volume which is entirely devoid of general comment, and contains nothing but an account of the known geology of the countries included in the Empire, with the necessary diagrams and maps, and brief mention of the more important economic minerals. The volume includes, in addition to the better-known parts of the Empire, the geology of ex-German East Africa (the Tanganyika Territory) the British area of the Cameroons and Togoland, ex-German New Guinea, the Bismark Archipelago, and the mandatory regions of Mesopotamia and Palestine. A selection of reference to the literature of the geology of each region is given at the end of each chapter. The geological information thus compiles has never previously been available in such condensed form, it having been, as the preface to the work states, "scattered throughout the pages of scientific journals and government memoirs, or found in foreign publications, most of which are difficult of access for the ordinary student, or too technical in character for the general reader". Much of what Dr. Reed has here collected must indeed have been quite inaccessible to the majority of readers.

While the scope of the work is strictly confined to the political boundaries of the detached areas that form the British Empire, and no general scheme of world geology is even referred to, there are illuminating statements here and there in the volume in regard to stratigraphical relations that could only be attempted by one whose knowledge was wide and accurate, and while the description of each selected locality is restricted thereto, the purview of the writer is so much wider as to enable him to attempt condensation and summarisation of a kind that would not be possible to a writer of narrower—though possibly more specialized—outlook.

The printing and format of the volume leave nothing to be desired.

THE REMOVAL OF DUST IN ROCK BORING.

"Gluckauf," the German mining periodical published at Essen a. Ruhr, Westphalia, contains in its issue of 23rd July an article by Bergassessor Wedding on the disposal of dust from the process of rock-boring underground. The ill effects of exposure to dust depends on the kind and quantity of the dust, the length of the exposure, the age of the workmen so exposed, and the nature and severity of the manual labour; which in its turn depends on the location of the working place and the arrangement of the drilling apparatus in use. Fine dust is more harmful than coarse dust, as it penetrates further into the bronchial tract. On the other hand, fine dust is more easily ejected and its tearing action on the body tissues is less. Sharp particles are of course more dangerous than rounded ones, and siliceous rocks are especially apt to give off harmful dust. The length of exposure to dust greatly increases the harmful effect, because the mucus membrane of the breathing tract loses its moisture through caking of the dust. Fine hair-like processes which cover the mucus membrane are in normal health in constant movement in the direction of the outer atmosphere for the purpose of ejecting dust, but they cease to function if covered with a dust layer, and damage is done to the whole breathing tract, setting up inflammation, swellings and lesions in the mucus membrane, and allowing dust to enter the lung tissues. Strong youthful individuals can withstand the harmful effects of breathing dust better than older and weaker individuals, but they suffer to a certain extent, especially if the type of boring machine used necessitates a more or less bent position, and the work induces rapid and deep respiration.

The nature of the working place plays an important part in the dust danger, as some spots are better ventilated than others. A strong air-current may be disadvantageous, because in restricted passages of the mine, the air-current may whirl about the dust as it falls out of the bore hole. Of especial importance is

the dampness of the strata and the mine atmosphere. The dust is naturally less dangerous under damp conditions.

The hammer-drill, with its succession of swiftly repeated blows, naturally sets up more dust and creates sharper particles than the rock-drill with a slower stroke, or the rotating drill; and, as the hammer-drill is held in the hands, the contact of the worker with the dust as it is ejected from the bore-hole is closer.

There are therefore many factors to be considered, which act in a varying manner to decrease and to increase the intensity of the dust-cloud. Long-continued drilling in dry hard sandstone with the hammer-drill is especially harmful, whereas boring in damp strata and soft shales with rotating-type drills under conditions of good ventilation is entirely without possibility of ill-effects.

Many devices have been tried to diminish the dust danger. The passing of water into the drill-hole entirely settles the dust, but it creates a condition that is onerous for the worker and is technically very difficult to arrange, because at every change of the drill the water-connection must be made anew, and a tight connection is difficult to maintain because of the vibration of the machine. Also the slime from the borehole is so disagreeable, especially in overhead holes, that the driller will prefer the dust to the spilling of water and mud all around and over his person.

The use of masks usually results in their rejection by the wearer because of their interference with his breathing and their general uncomfortableness.

The latest device is designed to remove the dust from the hole, immediately it is created, by means of suction set up by compressed air, and to lead it through a pipe to some place where it can be deposited without danger to the workers.

The Ministry of Trade & Commerce for the Mine District of Dortmund in conjunction with the Mine operators Association has carried out a series of trials extending over three months with devices of this nature. They consist essentially of a hood fitting over the aperture of the bore-hole, in which a sufficient suction is set up to remove the dust, and to transport it along a flexible pipe to the point chosen for deposition. A number of such devices have been designed and put on the market by Westphalian manufacturers of mine equipment, which, while differing in detail of application, are constructed with the same idea of removing the dust danger by removing the dust from the borehole and the vicinity of the worker to a point where it can do no harm.

The devices are said to have been successful in removing dust, but it is admitted that they entail a certain hindrance to drilling and some loss of time in changing the hood. Also in some cases, where the boreholes are placed in positions difficult of access some difficulty has been experienced in making room for the attachment of the hood and dust pipe. A thoroughly satisfactory solution of all the problems connected with the application of this device has not been found, and when the visit of an official has not been expected the workers have failed to attach the device.

Experiments have been made with hammer drills with a backward exhaust, instead of the usual exhaust towards the bottom of the hole, and further information regarding this development is promised.—F. W. G.

HOLLINGER PRODUCING $11,000,000

Indications The Company Will Crush 1,000,000 Tons In 1921.

ALEXANDER GRAY, Montreal.

Those who have the slightest regard for the economics of gold mining will find much that is instructive in the routine interim report of Hollinger Gold Mines for the thirty weeks ended July 29. It covers a period during a portion of which there was a shortage of power and of labor, consequently the increased tonnage milled reflects a reactive loss instead of the gain that would automatically be in effect. While the average daily crushing increased 500 tons and should have resulted in the lowering of cost per ton milled, it is obvious that gold mining operations are very susceptible to conditions, however temporary. For example: Whereas about 100,000 tons more or less went through than in the same period in 1920, the total income was $5,126,050.65 as compared with $4,012,242.28 in 1920. The total expenditure, including maintenance, was $2,786,129.16, as against $1,938,218.63. For a gain of $265,197.84 in net profit, therefore, there was a greater expenditure of $847,910.50—the total income was increased by $1,138,808.37. No doubt the extraordinary expenditure involved in providing coal when the power shortage was acute, is largely responsible for the added outlays—and a recurrence of this is what Hollinger Directors seek to avoid.

Hollinger operations are becoming altogether too important to be subjected to seasonal reverses. To have milled about half a million tons, is highly creditable to the management, in view of the handicaps. The grand total of income indicates a result for the whole year amounting to about $11,000,000 barring interruptions and if the prevailing premium upon gold continues. It would seem that the Hollinger will mill a million tons in 1921. The average daily crushing during the thirty weeks reviewed, was 2,406 tons. In more recent months the crushing have been much nearer to the milling capacity, hence the expectation that the years total will attain approximately to a million tons representing about $11,000,000 in gold and the premium on the same. Yet Hollinger costs will have to come down if the full force or the output is to be completely impressive. Grand aggregates such as the Hollinger offers suggest the utmost economy at the phenomenal properties and a larger appreciation among those who comprehend the import of this yellow metal. Getting the gold out of the ground at the lowest cost possible—and as rapidly as possible—will cure more ills than special taxation that will retard initiative.

BENZOL SCORES A SUCCESS.

The enthusiasts of benzol will be gratified to learn that this alternative motor power scored a distinct success last Saturday in connection with the Aerial Derby, for we understand that the race was won upon a mixture of motor spirit and benzol. This important success lends considerable weight to the popular belief that an admixture of about 20 per cent. benzol with motor spirit tends to increase the efficiency of the internal combustion engine. When one considers the phenomenal speed obtained by the fastest aeroplane in the Aerial Derby, the tip given above should certainly be worth following by motorists generally. —"Petroleum Times."

The Kathleen Coal-Mine Fire

Rapid Extinction of an Underground Fire, and Unusualy Quick Recovery of the Scaled-off Area By the Use of Oxygen Breathing Apparatus.

By EUGENE McAULIFFE, President and General Manager, Union Colliery Co., St. Louis, Mo.

(Reprinted from "Coal Age".)

On February 23, 1921, the Union Colliery Co., in operating in Kathleen mine, located at Dowell, Jackson County, Ill., experienced a rather disastrous mine fire. As usual, many unwarranted statements as to the origin of the fire were circulated. The explosion of a 150-kw. transformer, the presence of a supply of lubricating oil on the main entry and an accumulation of gas, each in turn was advanced as the cause of the fire.

As every transformer under ground was placed in service without repairs when the mine was opened, as no oil was stored or used on the main entry, and as it was impossible for an accumulation of gas to gather in an air-swept haulageway, the hastily-concocted theories as to the cause of the fire were set aside by the mine officials and state inspectors, who were conversant with the operation and its condition. The actual history of the accident and the subsequent recovery of the mine, which may prove of value to others, is substantially as follows:

About 11.50 a.m. on February 23, 1921, the mine engineer and his assistant were making some measurements in the third and fourth north headings turned off the main west haulage entries, these latter consisting of three parallel passages. Leaving the faces of the third and fourth headings where seven men were employed, they proceeded outbye against the air and noticed signs of smoke at a point about 1,900 ft. from the airshaft. Thinking that possibly the trace of smoke came from an overheated cutting-machine cable they hurried to the end of the main entry where a gang was at work cutting and loading coal.

Failing to locate the trouble at this point the engineer and his assistant started toward the airshaft on the center or main haulage entry and encountered dense smoke about 150 ft. from the point where the main entry intersected the third and fourth north and south entries. Hastily returning to the machine gang the engineer, accompanied by his helper and three miners, ran back, going with the air toward where the seven men were working, but were blocked by a dense accumulation of smoke when within about 200 feet of the fourth north entry. The engineer and his party turned and again ran west against the air and, crossing over to the intake or left-hand entry, they started toward the mine bottom. They found the fire breaking through a wood and fiber-plaster stopping at a point about 150 ft. south of the intersection of the main haulage entry with the third south entry.

An alarm was promptly given and a fire-fighting force was quickly organized. Orders were issued to withdraw from the mine all men other than those composing the fire-fighting force. Simultaneously calls for help were made on the state rescue team located at Duquoin, five miles distant. Likewise the neighboring mines were urged to send assistance in the form of apparatus and skilled men.

The first relief force, consisting of the Duquoin mine-rescue team composed of six men equipped with breathing apparatus, reached the mine after about three and one-half hours. In the meantime vigorous efforts were made to extinguish the fire with the aid of chemical extinguishers, scattering assistance coming from every quarter. All the employees were accounted for except the seven men who had been working at the face of the third and fourth north entries.

After every effort to control the fire and reach the seven imprisoned men was exhausted it was decided at 12.0 a.m., Feb. 24, thirteen hours after the fire was discovered, that the only hope of gaining mastery over it lay in sealing both shafts. This work was completed at 5.30 a.m., Feb. 24.

The territory occupied by the seven men, comprising a machine gang and two track layers, consisted of two entries each about 600 ft. long, two panel entries turned from them for a distance of less than 100 ft. and a parting driven in about 70 ft. from the third north entry. With the hope that the men might be able to brattice themselves off for a period at least, a geophone was obtained and used for some days, but without result.

Carbon Monoxide Came from Rescue Borehole.

In the meantime a 6-in. borehole was driven to the parting previously referred to. This hole entered the parting at 8.05 p.m., March 1. A discharge of carbon-monoxide gas under a pressure of 2 or 3 oz. per square foot ended all hope for the rescue of the imprisoned men. As showing the accuracy of both the underground and surface surveys and in support of the conclusions made as to the probable whereabouts of the seven men it should be here mentioned that the borehole entered the parting exactly as anticipated and when the mine was explored the bodies of the men were found about 20 ft. inbye from its point of entry.

Immediately after the shafts were sealed a standard "U"-type of water gage was installed in the seal above both shafts. On March 1, which was six days after the shaft had been sealed, the outside temperature stood at 65 deg. F. A self-recording thermometer located at a point about 4ft. below the top of the airshaft seal registered 62 deg. F. A comparison of temperatures and the variation in water-gage pressures shown in the accompanying table evidences the general trend of fire exhaustion.

The Kathleen mine is a new property, located on the east slope of what is known as the Duquoin anticlinal. The coal bed rises at a grade approximating an average of 5.5 per cent from the shafts toward the west property line. No marked variation in elevation between the north and south developments has so far been experienced. East of the shaft local disturbances which temporarily give off an appreciable amount of methane (CH_4) have been encountered and gas is exhaled from the working places, as is usual in this coal area. Nothing, however, of an extraordinary character has been met with in the

development of the property. The coal is left up for roof, as is customary in the southern Illinois coal field. This is a condition that lends itself readily to the rapid spread of entry fires

Enter Mine Three Weeks After Fire Starts.

Desiring to recover as quickly as possible the bodies of the men still underground, early consideration was given to the opening of the mine. Although rather extraordinary statements were made as to the rapid spread of the fire, the high temperature encountered in fighting it, and the like, it was decided, after careful study, that the mine could be successfully entered by March 18, or twenty-two days after the shafts were sealed.

Preparatory to this opening five state mine-rescue teams, equipped with oxygen breathing apparatus, each team consisting of six trained men, were furnished through their respective captains with a map showing the underground development, the location of the fire and the probable location of the bodies of the seven victims. An airtight lock was constructed over the airshaft, its general dimensions being as follows: Chamber over shaft, 9 ft. 4 in. wide, 9 ft. 4 in. long, 30 ft. high.

Immediately north of this chamber and separated from it by an airtight door an air lock 21 ft. 5 in. long, 6 ft. 3 in. wide and 6 ft. 9 in. high was constructed. This was provided with an exterior airtight door, affording ingress and egress. The inner door was located 5 ft. 2 in. from the shaft curb, the distance between the inner and outer doors being 15 ft. 3 in., which was sufficient to accommodate a timber car loaded with the 12 ft. lumber used for temporary stoppings.

The framework of this temporary construction was of 3 x 4-in. material, the sheeting consisting of 1 x 8-in. shiplap laid double with one thickness of building paper between. The top was covered with one thickness of byrkett lath made airtight with a thick coating

TABLE I. COMPARISON OF INSIDE AND OUTSIDE TEMPERATURES WITH VARIATIONS IN WATER GAGE

1921	Weather	Outside Temp. Hour	Deg. F.	Inside Temp. Hour	Deg.F.	—Max. Range— Hour	Plus Inches	—Water Gage— Hour	Minus Inches
Feb. 26	Fair, clear					3 p.m.	0.1	10 a.m.	0.0
Feb. 27	Fair,clear					2 p.m.	0.0	3 p.m.	0.1
Feb. 28	Fair, clear						0.0		0.0
Mar. 1	Fair, clear	3 p.m.	65	3 p.m.	62		0.0		0.0
Mar. 2	Cloudy								0.1
Mar. 3	Fair, cool					10 a.m.	0.0	1 a.m.	0.1
Mar. 4	Fair, cool	2 p.m.	69	2 p.m.	60	10 a.m.	0.0	1 a.m.	0.1
Mar. 5	Fair, windy	1 p.m.	70	1 p.m.	66	5 p.m.	0.2	10 p.m.	0.1
Mar. 6	Rain	12noon.	68	11 a.m.	64	10 a.m.	0.2	8 a.m.	0.1
Mar. 7	Rain and fog	2 p.m.	64	2 p.m.	58	4 p.m.	0.1	8 a.m.	0.1
Mar. 8	Rain	3 p.m.	68	3 p.m.	65			8 a.m.	0.1
Mar. 9	Clear and fair	2 p.m.	54	2 p.m.	56	4 p.m.	0.1	10 a.m.	0.1
Mar 10	Bright and warm	3 p.m.	64	3 p.m.	59		0.0		0.0
Mar. 11	Bright and warm	12 noon	64	12 noon	60	4 p.m.	0.1	8 p.m.	0.1
Mar. 12	Rain a.m., sunny p.m.	1 p.m.	70	1 p.m.	68	2 a.m.	0.1	8 a.m.	0.1
Mar. 13	Warm and sunny	4 p.m.	74	4 p.m.	72		0.0	8 a.m.	0.1
Mar. 14	Rain a.m., sunny p.m.	4 p.m.	76	4p.m.	72	2 a.m.	0.1		0.0
Mar. 15	Bright and warm	3 p.m.	82	3 p.m.	70	4 p.m.	0.1	6 p.m.	0.1
Mar. 16	Cool and clear	3 p.m.	66	5 p.m.	60	12 noon	0.0	1 a.m.	0.1
Mar. 17	Bright and warm	11 a.m.	70	11 a.m.	58	10 a.m.	0.0	2 p.m.	0.1
Mar. 18	Clear and windy	11 a.m.	76	1 p.m.	59	12 noon	0.0	10 a.m.	0.1

TABLE II—ANALYSIS OF AIR IN KATHLEEN MINE, DOWELL, ILLINOIS, SUBSEQUENT TO FIRE OF FEB. 23, 1921
Shafts sealed at 5 a.m., Feb. 24, 1921, air-shaft opened March. 16, 1921.

Date Sampled	From	Carbon Dioxide (CO_2)	Oxygen (O_2)	Methane (CH_4)	Carbon Monoxide (CO)	Nitrogen (N_2)
Mar. 1*	Airshaft seal	4.6	8.3	4.3	0.5	82.3
Mar. 1†	Drill hole	7.4	3.1	4.1	0.3	84.8
Mar. 11*	Airshaft seal	4.4	3.9	6.8	0.3	84.6
Mar. 11†	Drill hole	5.0	2.4	7.9	0.3	84.7
Mar. 17*	Airshaft seal	4.4	2.1	8.8	0.5	83.9
Mar. 17*	Airshaft seal	4.2	2.5	8.3	0.5	84.5
Mar. 17	Airshaft bottom	4.0	3.2	8.8	0.2	83.8
Mar. 17	Airshaft bottom	4.0	3.2	8.4		
Mar. 17†	Drill hole	4.5	1.8	10.4	0.5	82.6
Mar. 18	Airshaft bottom	3.6	1.8	12.0		
Mar. 19	Airshaft bottom	3.6	6.0	12.6		
Mar. 19	Airshaft bottom	3.4	4.4	8.0	0.2	84.0
Mar. 19†	Drill hole	4.4	3.2	12.8		
Mar. 20	450 ft. North of shaft	3.8	3.6	13.5		
Mar. 22	1,000 ft. Northwest of shaft	4.0	3.6	13.5		
Mar. 23	1,000 ft. Northwest of shaft	3.8	4.6	12.9		
Mar. 24	Northwest entry near first south	4.3	2.2	15.6		
Mar. 24	First south off main west	4.0	1.8	15.0		
Mar. 24	Northwest aircourse near third south	3.6	4.0	10.2		
Mar. 24	Northwest haulage near third south	3.6	4.0	10.2	0.4	83.4

*Taken from pipe extending about four ft. below seal.
†Taken from top of pipe in borehole driven to parting at end of fourth north entry about 600 ft. from where fire started.
Analyses shown as made at Urbana were made by the laboratory of the U. S. Bureau of Mines at Urbana, Ill.: those shown as made by Car No. 6 were made by the engineer in charge of the U. S. Bureau of Mines. Car No. 6, using portable apparatus.

of wood-fiber plaster. Two ordinary house windows were inserted in the wall for lighting purposes.

To forestall any possible failure to raise the cage in the event that a disarrangement of the power line supplying the electric hoist should cut off the supply of energy while the helmet men were below, a steam hoist, a steel line and sinking tub were fitted up, thus making quick emergency egress possible. In this connection it should be stated that the concrete shaft lining and the solid concrete and paving-brick construction employed in the fan house and in the air ducts made it readily possible to provide a thoroughly airtight seal. Beyond doubt this was an important factor in the early reopening of the mine.

After the lock was completed and the restoration forces were thoroughly organized, the airshaft seal was lifted on March 17. An oxygen breathing-apparatus team entered the mine on the following day, March 18, using the cage to descend to the mine bottom 232 ft. from the surface. The mine was found to be clear of smoke and the temperature to be 60 deg. F. The work of establishing a fresh-air base at the shaft bottom was then begun.

Fan, Steam-Driven, Made to Exhaust Slowly.

To this end five seals were quickly constructed of byrkett lath and wood-fiber plaster, and after a brick stopping had been removed the fan was started exhausting and driven as slowly as possible by means of its auxiliary steam drive. Thus pure air soon displaced the gaseous mixture at the bottom of the shaft. The analysis of air samples taken at various points is set forth in Table II.

Steady shrinkage in oxygen content from 8.3 per cent on March 1 to 2.5 per cent on March 17 proved the effectiveness of the two shaft seals as well as that of those applied to the fan chamber. To consume the oxygen within the mine would require the burning of about 50 tons of coal, for the total volume of the void within the mine resulting from the extraction of coal and top material approximated 700,000 cu. yd. The increase in methane (CH_4) content from 4.3 per cent on March 1 to 16 per cent on March 24 was noticeable, suggesting an appreciable explosive hazard deserving the closes attention during the recovery period.

At 9.30 p.m., March 20, a second advance of 500 ft. was completed and at 2 p.m., March 22, five additional seals brought the air into the bottom of the main west entry about 700 ft. from the airshaft. At 2 p.m., March 24, with the completion of ten additional seals, fresh air was brought within 500 ft. of the fire zone. Examination beyond this point showed that all three entries were heavily caved and that, immediately below the falls, the temperature was about 79 deg. F. Three additional stoppings immediately below the fire zone were completed at 4 p.m., March 25.

As no further advance could be made by way of the main west entry, the men were withdrawn from the mine and, after removing the seal above the main shaft, the fan was started on pressure — that is, blowing — at normal speed. On March 28 the gas men entered the mine and made a complete examination. It was found to be free from explosive gas and the bodies of the seven victims were located in the parting off the third north entry, as before mentioned.

After the removal of the bodies on the morning of March 29 an exploration of the west end of the fire zone was made. The fire area was found to be restricted to the three main west entries, not reaching into the third and fourth cross entries. Although no smoke or visible evidence of active combustion was found at the west end of the fire zone the temperature at this point stood at 85 deg. F. With the construction of three stoppings above the fire line the burned area, about 250 ft. in length, was completely isolated. On April 6, with six concrete seals in place and surrounding the fire zone, the production of coal was resumed.

Ascertain Main Haulageway Had Caved Most.

On May 28 the two outside concrete seals at the lower or eastern end of the fire zone were removed after two doors had been constructed below them. Then, with all except two gas men withdrawn from the mine, 20,000 cu. ft. of air per minute was driven through the fire area. The temperature at the time of unsealing was 80 deg. F.

On May 29 a partial exploration of the caved entries was made. This showed that the left-hand or intake entry was heavily caved for 130 ft. of its length. The right-hand or return entry was similarly caved for a distance of 90 feet, and the center or main haulageway was found to be heavily caved for a distance of 200 feet. This entry showed evidence of having been subjected to the most intense action of the fire, the two outside entries being less severely damaged.

With gas men in constant attendance the air movement through the fire area was continued throughout the night of May 29, the temperature of the return air current rising gradually until it reached 170 deg. F. at 10 a.m., May 30. At this point the doors were closed and the concrete seals restored. It was evident that a hot coked or semi-coked mass at some point within the fire area had retained ignition heat. With the resealing of the place the temperature of the gas sampled through a valve in the lower central seal quickly dropped to 70 deg. F. The fire area will be kept sealed for a period sufficiently long to insure the complete exhaustion of all inclosed air and the extinction of the fire. A new roadway, developed to reach the territory beyond the seal area, is now being used.

Barometric Pressure Rises One-Half Inch.

Only one alarming situation developed in connection with the work of recovery. Until the seal was taken off the airshaft an extremely uniform barometric pressure was experienced. At 6 p.m. on March 20, however, the barometer stood at 29 in., thereafter rising gradually, until it reached 29.50 in. after twenty-four hours, this pressure being maintained for sixteen hours. At 10 a.m. on March 20, the barometer stood at 29.51 in. and thereafter gradually dropped for fifty hours, reaching its lowest point, 28.64 in., at noon on March 24. The fall thus occurring in fifty hours amounted to 0.87 in., equal to 11.82 in. of water, or an air pressure of 61.5 lb. per square foot. In the twenty-four hours preceding 2 a.m., March 24, the barometer fell 0.52 in., equal to a water gage of approximately 7 in. or an air pressure of 36.4 lb. per square foot, causing gas to leak past the temporary stoppings, thus forcing the men working without helmets outbye to withdraw from the mine. This experience demonstrated the value of careful barometric studies in the conduct of recovery work.

Top Coal Fell, Bringing Down Trolley Wire.

Any study of this accident would be incomplete without some conclusion being drawn as to the cause of the fire. An empty trip had passed through the main haulage entry about twenty minutes before the fire was discovered. The entry was clean of all combustible material other than coal, no oil or explosives were in the vicinity, and no explosion of any kind occurred at this point.

The conclusion may be reached, therefore, that the trolley wire supported from the top coal, which throughout the entire southern Illinois field is left up to protect the shale roof, became loosened and fell, bringing the wire down onto a new section of track, laid with 40-lb. rail and put in a place only a few hours before, after a derailment. Failure to replace immediately the bonds, which it is the practice to arc-weld into position on the return, made an arc of serious proportions possible, the insufficient return preventing the circuit breaker from operating to cut off the current. Under such circumstances as these the fallen top coal would offer a splendid vehicle for the quick spread of a fire.

The brief period intervening between the sealing of the shaft and the reopening of the mine was made possible to a large extent by the character of the shaft and top construction employed, the fan, fan house and air duct making airtight sealing a reality. While it is not customary to anticipate the sealing of shafts in advance, the engineer designing the top works can without expense readily give consideration to such a contingency..

The Illinois State Director of Mines and his staff conducted the work of recovery throughout and were ably assisted by the representatives of the U. S. Bureau of Mines, which, as before stated made the necessary analyses of gas shown in the accompanying table. This work was thorough and painstaking. Extraordinary precautions were taken to insure that all helmet men were in perfect physical condition and a competent physician and surgeon was in attendance at all times.

Gas Being Plentiful, Unusual Care Taken.

In addition, a man with extensive experience in the use and maintenance of helmet equipment scrutinized every man and the condition of his breathing apparatus as he stepped into the lock chamber. Where it was necessary to take down brick and tile stoppings these were removed by digging the fireclay from beneath them. No sledges were used in the explosive-gas area, and the temporary stoppings constructed of timber were put up with small nails driven with copper hammers.

Outstanding details in connection with the work were: (a) The careful analysis of gas samples taken at frequent intervals, which showed a loss of oxigen content in the mine atmosphere indicating the rapid exhaustion of the fire. (b) The painstaking study and planning of recovery operations done in advance, giving every man connected with the work a full opportunity to acquaint himself, through the medium of the mine map, with the exact situation. No suggestion from whatever source was considered unworthy of careful consideration. (c) Though the helmet crews worked in continuous shifts to accelerate recovery, no undue haste was permitted, and no one was allowed to go an undue distance ahead of fresh air. This made it possible to carry out a man who might from sickness or accident to his apparatus need a quick removal to fresh air.

Well Equipped With Fire Extinguisher.

The foot of the airshaft of the Kathleen mine is equipped with a water line and portable chemical extinguishers are placed at every door and parting. A telephone service is maintained underground. A fire-foam engine is kept on the surface and a duplex carbon-dioxide extinguisher holding eighty gallons of chemical, quickly refillable from a water car, stands at the bottom ready for movement any where within the mine. In addition to these precautions a pressure tank mounted on wheels which will hold about 350 gallons of water under air pressure is being constructed for use in the mine workings. These two underground extinguishers are each equipped with 100 ft. of hose an fire nozzles. Permissible explosives are used for shooting the coal, which is undercut by chain mining machines. No other fire trouble than the one just related has ever been experienced in this mine.

Experience gained in subduing this mine fire is here set forth in detail with the thought that may be of value to mine managers and superintendents generally and that as a result the occurrence of similar disasters may be prevented.

LAKE SUPERIOR CORPORATION.

The annual report of the Lake Superior Corporation for the year ending June 30, 1921 shows earnings of $1,541,293 as compared with $3,722, 152 in the previous year. Raw materials were obtained at high prices early in 1920, before cancellation and suspension of booked orders began. New business was secured later at reduced prices. Suspension of operations for 74 days piled up charges against operation. Under the circumstances it was not expected that the earnings would compare favorably with those of the previous year. The directors expect improved conditions in the iron and steel trade during the coming year.

During the past year the corporation produced 327,906 tons steel ingots. The subsidiary coal companies produced; Cannelton 474,848 tons and Lake Superior 235,933 tons. Coke production was 429,041 tons, limestone 235,399 tons and pig iron 362,805 tons.

BAILEY COBALT MINES LTD.

According to a notice to shareholders a meeting will be held Sept. 23 with a view to having the 'winding up' order terminated and the liquidators discharged and the company permitted to carry on its business.

The property of Bailey Cobalt Mines Ltd was sold to Bailey Silver Mines Ltd a year ago. The 425 000 shares have not yet been received by the shareholder and to obtain the necessary authority to make application for them requires that a meeting of shareholders be held.

LAKE SHORE

At the annual meeting of the Lake Shore Mines Ltd, held Aug. 20 the directors were all re-elected. Mr. Harry Oakes is president and managing director. A. G. Sloght and W. H. Wright, vice-presidents, Dr. W. P. St. Charels, treasurer, Kirkland Securities Ltd, secretary. R. C. Coffey is mine manager.

The Asbestos Industry[1]

By J. G. ROSS.[2]

Recent rumours of proposed provincial legislation to compel the manufacture of asbestos in Canada serve to direct attention to the large part played by the production of asbestos in the mineral wealth of Quebec.

Information relating to producing mines in Canada, foreign production, varieties and uses of asbestos, etc., is clearly and fully detailed in the annual reports of the Quebec Bureau of Mines that it is unnecessary to occupy time and space in repeating these features Certain general aspects of the industry only will be referred to.

Production and Value.

The figures given by Mr. T. C. Denis, Superintendent of Mines for Quebec, for the first half of 1920, show a production of asbestos and asbestic in the province of 82,500 tons, valued at $5,763,000 whereas for the previous 12 months, the output was 160,000 tons, valued at $10,995,000. The total value for 1920 should exceed that for 1919. (A preliminary estimate, published since this paper was written, places the total value of the 1920 output at $14,718,131.)

Valuation.

It would be interesting to know on just what basis these values are arrived at. Three at least of the larger mines are controlled by foreign asbestos manufacturing companies, and two other Canadian companies maintain sales offices outside of Canada.

Do these companies invoice their fibre at cost prices or at full market value, and does the Government collect the full tax to which it is entitled? If it does not, the other companies are carrying an excessive share of the tax burden. If the Government were collecting on the full market value, it might receive the amount which it estimated the industry should turn in to its coffers, and could take more time to study fully the effect on the industry of having manufacture completed in Canada.

Tax.

A Provincial tax is levied on the invoiced value of shipments. During the year, despite the protests of the Asbestos Mine Operators' Association, the tax was increased to 5 per cent from 3½ per cent. All contracts for sales are made plus the provincial tax, so that the buyer pays the tax. The chief argument against the increase in the tax was that higher prices would tend to force foreign dealers to prospect and develop deposits in other countries. Less harm might be done to the industry if this tax were not so definitely brought to the attention of purchasers.

That high prices of Canadian fibre, particularly crudes, have assisted the development of outside resources is shown by the increased development of Arizona properties, larger shipments from South Africa, and the active prospecting being done in California. South African blue fibre is even being used by one manufacturer in Canada.

The effect of higher prices is indicated in the lessened demand for low grade stock, and the use of substitutes and adulterants in manufacturing. On the other hand, the high prices have also forced manufacturers to use the lowest grades, so that products which formerly went to the sand dump have been recovered and shipped at a profit.

Organization.

Another attempt has been made toward co-operation among the companies by the formation of an Asbestos Mine Operators' Association. That there is a need for some such organization has several times been recognized by the formation of similar organizations during past years. Several matters of common interest, such as labour problems and legislation, have already been dealt with satisfactorily. The usefulness of such a body depends on the willingness of the members to work in harmony.

The necessity for getting together is admitted. By doing so, subjects of common interest can be discussed, and solutions mutually helpful arrived at.

A suggestion has been made for a central bureau, which would employ a staff of engineers and geologists. Geological problems common to the district could be worked out in detail, and the benefit of these studies made available for all properties.

Mining systems might be devised suitable to the rock and to the stage of development of each property. Experience gained at one property might be used with profit at several others.

A central experimental mill could not fail to improve methods of fibre recovery. The proper system for obtaining the most suitable grades of fibre from each variety of rock could be devised. Research work done at some of the mills has resulted in such marked improvements in recovery that there is little doubt that the elaboration of such work would have a marked effect in increasing the total value of the product from the district.

Such a central bureau could also keep in touch with outside development in production and manufacture, and advise operators accordingly.

To evolve such a system it would be necessary to regard the whole Canadian field as one unit, as opposed to all outside areas. By close co-operation with the Department of Mines and the Provincial Government, the Canadian asbestos industry might be placed on an independent footing, and all fear of outside competition removed. This should result largely in the elimination of the periods of depression which have had so disastrous effect on the mines, shareholders and workmen, as well as on the revenue to the Government.

The recently organized Thetford District Branch of the Institute will undoubtedly prove beneficial to the industry, since its periodic meetings afford an excellent opportunity for the engineers and staffs of the different mines to discuss local problems together, and interchange suggestions for their solution.

Many engineers from metal-mining camps have recently entered the asbestos district, and with the application of engineering knowledge gained in other fields, improvements to prevailing systems of mining and milling are to be expected.

Geology.

The publication of Dr. Harvie's Geological Report and Map of the District is anxiously awaited, as much prospecting is planned for the coming season. Some

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[1] Presented at the Annual General Meeting, Montreal, March, 1921.

[2] Consulting Mining Engineer, The Milton Hersey Company, Ltd., Montreal.

areas have been surveyed privately by geologists, and a considerable amount of drilling is being done to prove increased ore reserves.

The successful establishment of another mill in Coleraine has revived interest in the westerly end of the district. Three new mills are in course of construction, and three other old properties in this area are being developed anew.

In the easterly part of the field, where no crude is produced, the outlook is not so promising, and continued profits must be looked for by improved methods of milling and decreased costs.

Mining.

As workings increase in size, the mining methods undergo a normal evolution. The smaller pits are economically worked by derrick hoists or cables; but as a face of sufficient extent is opened, the introduction of cranes reduces the mining cost; while at mines producing no crude, the steam shovel is replacing the derrick with benefit shown on the cost sheet. Underground mining is more of a necessity than an advance, except in the case of glory hole work.

Milling.

Careful research work in some of the mills is resulting in most satisfactory improvements. By means of test runs, and analyses of products, information has been gained on which to plan changes in treatment. At one mill practically no fibre is now being produced lower than a high grade shingle stock, and yet the tails to the sand dump show a loss of less than 0.10 per cent of short fibre.

Present methods of grading are unsatisfactory, and further research is being done to control the grades, both on fibre from mill and from storage, within more narrow limits.

Labour.

Strikes were called at two of the mines, and were the result, principally, of conditions peculiar to the district. As these strikes occurred at a time when labour in general was becoming more plentiful, work was resumed at former rates.

As there was not sufficient labour during the summer to operate night shifts as usual, the production, especially of crudes, was below what was expected. This probably was one cause of prices remaining at a high level.

Two of the larger mines being at present shut down, the labour so released, together with an increased supply from outside, affords full crews to the operating properties. Wages have not been reduced, but there is a marked improvement in the efficiency of the workmen. Moreover, as a result of the men working more days per week than during the past year, the effective labour supply has been still further augmented.

The housing shortage adversely affects the labour situation, as it is difficult to assemble crews of steady men unless suitable accommodation for families is provided. In view of the falling prices of materials, and increased efficiency of the workmen, several companies are now planning housing programmes on an extensive scale.

Prices.

Quotations from "Engineering and Mining Journal," February 19th, 1921, are as follows:—

	Per Ton.		
Crude No. 1	$2,000.00	to	$3,000
Crude No. 2	1,100.00	to	2,000
Spinning Fibres	400.00	to	1,000
Compressed Sheet Fibres	325.00	to	500
Shingle Stock	110.00	to	150
Paper Stock	60.00	to	75
Cement Stock	17.50	to	30
Floats	8.50	to	15

Prices are per short ton f.o.b. Thetford, Broughton and Black Lake mines, Quebec, 5 per cent to be added as export sales tax.

It may be of interest to compare with the above prices those prevailing a few years ago. The following table, taken from the Report of the Quebec Department of Mines for 1915, gives the average value per short ton of the various grades of asbestos in 1914.

	Per Ton
Crude No. 1	$301.96
Crude, No. 2	131.85
Mill Stock, No. 1	60.40
Mill Stock, No. 2	24.93
Mill Stock, No. 3	11.18

The increase in prices has actually been greater than the above figures indicate, as a shorter fibre is now sold as No. 1 Crude, than in 1914, and the average spinning or other stock shows a lower test.

Consumption of Fibre.

With the world-wide depression in trade and the prevailing rates of exchange, it is to be expected that the demand for fibre of all grades will be lighter. On the other hand, with increased supply and efficiency of labour, and new mills, production will increase. The exceedingly favourable weather for open pit work during the winter has already been responsible for an increasing quantity offered.

To take care of an expected increased production, asbestos manufacturing companies have instituted an active advertising campaign in which the mine operators have joined. This campaign is for the purpose of educating salesmen and the public in possible uses of fibre, and to expose cases of adulteration or substitution in articles advertised as being composed of, or containing asbestos.

Manufacture in Canada.

At present one plant at Lachine manufactures asbestos shingles and allied products. A plant at East Broughton has commenced the manufacture of brake lining. In Ontario, one plant is in operation, and two others are carrying on experimental work in the manufacturing of asbestos products.

Outlook.

The immediate future of the asbestos industry is in the hands of the mine operators. If past policies are pursued, former experiences will be repeated. Large stocks of fibre will accumulate, and buyers will hold off. Stocks will have to be sacrificed to meet expenses, and properties, those making low grade fibres first, will be forced to close down with a resulting period of idle mills and unemployment.

If, however, there is co-operation, production can be maintained at market demands only, and efforts can be concentrated on producing the most suitable grades of which a given rock is capable under the proper milling system.

A large production of low grade fibre, with corresponding tailing loss, is not so remunerative as a less production of long fibres properly milled. It is now recognized that, if the best results are to be obtained, the rock in each different area requires its own special method of milling. By experimental milling, a flow

sheet which will give the maximum profit from any given rock should be advised at each mill.

The fact remains that Canada supplies over 80 per cent of the asbestos fibre used, and notwithstanding the incentive of high prices to prospect other fields, the Canadian fibre is still in greater demand and commands a higher price than fibre of equal length from outside sources.

With careful handling of the present situation there is no reason why asbestos mining should not maintain its premier position in the Quebec mineral field.

HYDRAULIC STOWING.

At a meeting of the South Wales Institute of Engineers, at Cardiff, on the 14th inst., Mr. J. Drummond Paton, of Manchester, and Prof. George Knox, principal of the South Wales School of Mines, read a joint paper on "Hydraulic Stowing." Mr. W. Forster Brown, M. Inst. C. E., the president, occupied the chair.

The lecture was illustrated by a number of lantern slides showing some of the installations already in use. Mr. Paton said since 1901, when the first modern equipment on a large and economic scale was erected by Berrygrat Willigar at the Myslowitz Mine in Upper Silesia, the system had been adopted and continuously improved in other Austrian German, Belgian and French mines until it had become a generally accepted practice in modern mining engineering, but no extensive application had yet been made in this country. A small installation had been worked by the Wishaw Coal Mining Co., Motherwell, and a still smaller installation at Crowgarth iron ore mine, and also at the Weymss Colliery, in Fife.

In the early stage of development of hydraulic packing ordinary cast iron pipes were used to convey the packing material and water into the workings, but the rapid internal wear caused by the grinding action of the packing (particularly in the horizontal pipes) led to the use of linings. At first, hard wood linings were used but except in the case of sand packing as in the Transvaal, these were not satisfactory, as they wore out very rapidly and required very large diameter pipes for large volumes of packing material. Mild, ungalvanized steel pipes were then tried, but these also had to be frequently renewed when unlined. The three types of pipe line now in use are: (1) Mild steel or cast iron pipes with steel lining; (2) steel pipes lined with porcelain; and (3) oval shaped linings on the narrow or under-side. Porcelain pipes are estimated to pass 180,000 to 200,000 tons of stowing material before requiring renewal, and iron or steel lined oval pipes will pass 200,000 to 1,400,000 tons of packing material per inch wear of linings.

Mr. Paton stated there was no district in the British coal fields in which the advantages of hydraulic stowing would be more beneficial than in South Wales. In getting a large amount of permanent support in the gob, the squeeze of the overlying rocks would be more evenly distributed thereby increasing the safety from falls of roof and sides and reducing the high cost of initial timbering, and the subsequent repair work. The ventilation was also improved owing to the reduction of leakage through open packs and the filling up of old disused roadways, but the greatest advantage would probably be the lessening of the risk for explosion. If this could be done the greatest problem in the South Wales steam coal collieries, that of coal dust deposits, could be easily solved by a system of watering on the roadways which when combined with the partial laying of dust on the face would do more to render these mines safe than could be accomplished by any system of stone dusting. As subsidence was the cause of producing the need for roof supports, the better regulation of subsidence would naturally appear to be the best way of attacking this problem. The saving effected in the cost of timber would go a long way towards the cost of applying hydraulic stowing if it could be shown that the process does effect better regulation of the subsiding surface. Where hydraulic packing is in use no coal barriers need be left as a continuous pack of flushed material would serve the same purpose. Neither was it necessary to leave ordinary pillars of support for surface property, railways, canals, etc., thereby effecting a large saving in the loss of valuable minerals. Hydraulic packing, for which so many advantages can be claimed, can be applied to the working of any kind of mineral and to almost every method of working them.

In its practical application there were many difficulties to be overcome, but surely British engineers were quite as capable of overcoming these as their colleagues on the Continent had been, and they had the further advantage of making use of long years of pioneering experience already gained in its application.

COAL MINING REGULATIONS.

The Department of the Interior has ready for distribution copies of regulations for the disposal of the coal mining rights in the province of Manitoba, Saskatchewan and Alberta, Yukon and North West Territories, and the railway belt in British Columbia. They supersede with amendments, regulations published in 1918. Lands may be leased at an annual rental of $1 per acre for a term of 21 years. The maximum area of a coal mining location is 2,560 acres. In addition to the rent a royalty of five cents a ton is levied. The lessee is required to commence active operations on his leasehold within one year from the date he is notified to do so, and to produce a minimum tonnage of coal stated in the notification. Leases are subject to provision that settlers may buy coal for their own use at the pits mouth at a price not to exceed $2.75 per ton.

"THOMPSONITE" NOW BEING MANUFACTURED.

All necessary permits having been granted, the Thompson Powder Company, Ltd., manufacturers of high explosives, with works at Deseronto, Ont., and business offices at 163-7 Yonge Street, Toronto, are now manufacturing "Thompsonite," and this product is now on the market. Considerable attention has been given by mining engineers to this explosive. Numerous and stringent tests, with what are claimed to be notably successful results, have been carried out. The capacity at which the Company can produce this powder is at the rate of six tons a day.

WHITE ROCK.

It is reported that some very high grade ore has been encountered in the drift at the White Rock mine, West Shiningtree. The White Rock is controlled by Mr Wm. Vittie of Sudbury.

PLATINUM "LOSS" AT SUDBURY IS EXPLAINED.

J. A. McRAE.

With respect to the press despatches which a few weeks ago set the mining fraternity of all Canada agog with the assertions that $60,000,000 had been lost to Canada annually for the past 25 years in the form of platinum and other metals of the group in the Sudbury nickel ores, the writer has established communication with Dr. Ami, the author of the alleged statement.

Dr. H. M. Ami, who is Acting-Governor of the Imperial Resources Bureau, and Technical Advisor to the High Commissioner in London, says, in part:—

"Mr.————, of the Geological Survey, Ottawa, has transmitted your letter to him asking for the full text of remarks credited to me in respect of platinum metals recoverable from Sudbury ores.

"The amount given was a low one—but the press made me say that $60,000,000 worth of platinum had been lost to Canada "**annually**" for 25 years past. The word annually should be deleted.

"I am specially interested now, in seeing that Canada gets a straight deal with respect to the weights and values of its ores, especially as regards the precious metals recoverable from the ores of Sudbury."

Dr. Ami further states:—"I think that $60,000,000 loss for 25 years is not at all an exaggeration. You have only to read the Royal Ontario Nickel Commission's report to be impressed with hard facts and figures."

Dr. Ami is at present with the Imperial Mineral Resources Bureau, 2, Queen Anne's Gate Bldgs., Westminster, London, S.W.I. The Bureau is at present completing reports covering the mineral and metal resources and production of the Empire for the war period, 1913-19. For comparative purposes the reports have also covered the resources of countries outside the Empire. The Bureau enjoys the services of 148 British chemists, metallurgists, mineralurgists and mining engineers and represents every Dominion and Colony of the Empire except South Africa which is now making arrangements to join.

Where Mistake Occurred.

The despatch is question which misquoted Dr. Ami said, in part:—"In 1916, says Dr. Ami, Canada was only credited with 15 ounces of platinum, whereas one mine alone in the Sudbury district might have produced 15,892 ounces, amounting in value to $1,700,000. Dr. Ami believes that from 3,000,000 to 4,000,000 ounces of precious metals are recoverable from the Sudbury nickel mines. The Bureau, he states, is thoroughly appreciative of Canada's mineral output, which last year reached a total of $217,000,000."

The despatch then dealt with the Australian situation, and continued:

"Reverting to platinum and other precious metals of the same group occurring in the Sudbury district, Dr. Ami says that the Bureau has actively considered this matter with a view to recovering the weights and values which should come from this valuable mining centre. Probably $60,000,000 worth of the platinum metals have been lost annually for 25 years past."

Brief Explanation.

With respect to the above despatch, it will be noted that the word annual in the concluding paragraph should be deleted. This being so, then the estimated annual loss is greatly reduced, although the aggregate for a quarter century is startling. To those familiar with the business of mining, however, it is less imposing than may at first appear.

For instance, it might be well to take the silver field of Cobalt as a comparison. It is recognized in mining that a recovery of 95 per cent of the mineral content of the average silver ore is quite satisfactory. The mines of Cobalt during the past eighteen years produced over 300,000,000 ounces of silver. Allowing for a loss of five per cent. in recovery, the aggregate loss here in silver alone would amount to over 15,000,000 ounces in eighteen years. When the mines of Cobalt were at their best in 1910-11 the annual loss in silver may have reached 1,500,000 ounces annually. In addition to this silver, was unavoidable losses of cobalt metallics, cobalt oxides, and arsenic.

Therefore, Dr. Ami appears to heve made the mistake of classing unavoidable losses at Sudbury with avoidable losses. It is true, perhaps, in fact is the case, that improvement in recovery is being made, but a full 100 percent recovery will probably never be attained and the assertion that vast quantities of precious metals are being "lost" leaves the impression that there is glaring inefficiency, which is not the case.

Dr. Ami is known to be working for the general welfare of the mining industry of Canada, and the impression which his remark has left is perhaps entirely contrary to the intentions of the author. The statements merely become dangerous and dilated when coming to the attention of the novice in the business of mining.

THE FUTURE OF COPPER SMELTING: A FRENCH FORECAST.

In a recent issue of "L'Information Economique," M. L. Moynot discusses the causes of the present depression in the copper-smelting industry, chief among which he includes the rise in the cost of fuel. After explaining the various processes employed in the industry, the writer arrives at the following conclusions with regard to the development which it may be expected to take. The very great increase in the cost of coal and coke, coupled with the slump in the copper market, will force producers to abandon processes which although they have served their purpose, have to-day become too costly to work. The reverberatory-furnace method and that of the water jacket working with coke are alike doomed, and will only be employed in exceptional cases. The same applies to hydro-metallurgy by lixiviation and steam cementation of ores which have been simply roasted. The water jacket with pyritic fusion and bessemerisation, as also the natural slow cementation of the ore, are likely to become more and more popular. Chloride roasting will be found very useful in certain cases. Finally it will be found that one of the best means of reducing the production cost of copper is to make a better use of the other metals by which it is accompanied in complex ores. "Mining Journal", London.

Mr. J. A. McRae, our Northern Ontario correspondent will leave for Manitoba towards the end of August and will visit a part of the northern mineral belt as special representative of the "Journal". The Rice Lake, Elbow Lake and Beaver Creek localities will be visited.

Montreal River in Retrospect and in Perspective

ALEXANDER GRAY, Montreal.

"Warts on my Fingers,
Corns on my Toes,"

Thirteen years ago the men of the Gowganda Trail sang this jingle of the pack, the portage and the paddle, slept in the snow, the lean-too or in one of those double-deck devices which were luxurious to the weary, inconvenient to the overweights—and economical to landlords.

"I don't care how she goes"

was the concluding line of that refrain.

Nor did they. Trudging from "steel" in Summer; staging it by sleigh or "hiking" on snowshoes in Winter; pushing canoes from Latchford or further up the river; those who confidently staked the Temagami Reserve were as buoyant as the devil-may-care of anywhere can be. From Portage Bay and Pork Rapids to Fort Matachewan, and on to Shining Tree, they drove in their discovery and corner posts, made affidavits they had "minerals," the "vein calcite" and "bloom —all "in the diabase"—and the Annual Report of the Ontario Bureau of Mines for 1908 contained this glowing paragraph:

> "Indeed it may be said that at the close of 1908 the excitement caused by the rich specimens of native silver found in the neighborhood of Lake Gowganda have not only raised the hopes of prospectors and mining men generally, but have reinflamed the public mind and paved the way for a recurrence of the Cobalt boom of 1906."

So "mushing it" went on. "Tommy" Torrance was he was raking in fees, adjusting disputes. Government railway receipts were augmented by passenger receipts and general freight. Latchford and Elk Lake City hotels and boarding-houses were crowded. Pork and beans were good enough for the "sour doughs." Becootied stopping places afforded shelter. Prospectors and speculators had the urge, thought in millions, raised the limit when they found "native"—and every foot of ground from Maple Mountain and the Moosehorn to the Mann ridge was "another King Edward," or "Kerr Lake" mine. Companies were incorporated with random capitalizations. Unhallowed is the memory of those resorts which harbored more than humans, although their hospitality was shared by embryotic millionaires and moccasined adventurers whose worldly belongings were what they stood up in or carried a'pack.

Knights of the Snowshoe went and came without regard to the hardships. Tote straps to me were a badge of honor worn by the sturdy who labored through the bush. Breaking trails was part of the daily routine. Then the corduroy eased navigation across muskeg—eventually the sybaritic sightseer arrived in sleighs, coonskins cap-a-pie, wind-shields—and commissariats suited to the epicurean tastes of those who play with their own—or other people's—money. It was exhilirating while it lated. Foliated silver—"rich specimens"—tickled the fancy, but cooling cracks and short ore shoots soon dampened the ardor of the most optimistic—and the Recorder for the Montreal District writing of 1910 had to admit:

> "The work of developing the mining land of the Montreal River Mining Division has not been carried on with the same energy that marked the period of 1909, but those remaining in the district are still of the opinion that it will eventually produce a large quantity of valuable mineral. The counter attractions provided in the Porcupine camp have joined with the operations of unscrupulous speculators in producing depression which usually follows a mining boom. The stringency of the money market and the hesitancy of capital to invest in mining ventures has confined the work of development in this division to an area which is considerably smaller than one worked a year ago, but the optmists who have remained secured very gratifying results during the past summer. The development of the new finds that have been made in Willet, James and Tudhope should enable investors to arrive at a satisfactory estimate of the value of the district during the coming summer."

The "recurrence of the Cobalt boom of 1906" and the "satisfactory" determination foreshadowed by Recorder Skill, as quoted herewith, did not materialize. The "optimists who have remained" through the intervening years have a standard gauge railway to Elk Lake, but there are few records of ore shipments; yet the Mining Recorder of the district, wrote as of 1919:

> "Business in this office during the year has been very good. Many new mining companies have been formed and considerable mining machinery installed on various properties. As several very rich discoveries of gold and silver have been made during the latter part of the year, this division no doubt will recover much attention from the prospector and the mining companies during the coming year."

Eleven years then had elapsed since the discovery of silver in 1908 in the vicinity of Miller, Leroy and Calcite lakes—and the impression still is strong that this district sooner or later will be the chief source of Ontario silver production. No end of head gears serve as tombstones for the ill-matured enterprises. Abandoned shafthouses and surface plants ruefully attest the folly of those who mistook samples in cracks for millions in a fissure. Silver Lake has been given the go-by. The Otisses, Downey, Casey, Devlin, Elk Lake Discovery, Gavin-Hamilton, Langhan, Lucky Godfrey, Mother Lode, Moosehorn, Foster, and their contemporaries, are aching voids. The "considerably smaller" area mentioned by the Recorder in 1910 as represented by the Miller Lake-O'Brien has produced about 5,930,000 ounces of silver, as follows:

Year	Ounces Silver
1910	481,583
1911	468,687
1912	549,976
1913	502,370
1914	399,300
1915	242,229
1916	360,670
1917	1,064,635
1918	638,198
1919	722,564
1920 (x)*	500,000
	5,930,152

* Estimated.

Of that production and its sources, Mr. A. G. Burrows of the Geological Department of the Ontario Department of Mines has authoritatively stated:

"The greater preponderance of the ore shipped has come from northwest of Miller Lake. Several shipments of high grade silver ore have been made from the Mann Ridge west of Gowganda lake. In 1910, 1911 and 1912 the Millerett mine was the chief producer, and since that time the Miller Lake—O'Brien. The latter deposit has supplied most of the silver ore yet shipped from Gowganda. With the exception of an ore shoot in conglomerate in the Millerett mine, which produced about 500,000 ounces of silver, all the ore to the end of 1919 has come from the diabase sill."

The geological chiefs of the Ontario Department of Mines repeatedly have indicated their faith in this diabase sill, especially at or near to its hanging and foot walls, wherever there is a contact with the Keewatin. No doubt it was this knowledge sustained by the outputting records that has encouraged holders of claim areas in and about this sill. One ore-shoot in the Huronian conglomerate held a position that was without another element of encouragement until the Miller Lake O'Brien geology was disentagled and this condition as described by Mr. Burrows was revealed:

"The most important veins known as No. 2 vein system, produced most of the ore in the early days of the mine. Development showed the veins of this system to dip steeply to the west, with the pitch of the ore-shoots to the south. Of this system, the foot-wall veins have been the most productive. The ore shoot in the hanging-wall veins did not extend to the 140-ft. level, whereas the foot-wall ore body continued nearly to the 350-ft. level. Each of these series carried two or more veins, which were sufficiently close together, where the ore shoots occurred, to allow mining in one stope. The veins were generally from two to five inches wide, and in the ore shoots individual veins were not always productive, but where one was barren, a parellel vein would carry the high-grade ore. Very little ore was taken from this system above the 60-ft level. The great proportion of the silver values was confined to the veins themselves, there being only a small impregnation of the wall rock.

This, No. 2 vein system seems to have been delimited by east and west faults, althougt the veins carrying the ore are said to have been only slightly displaced by the faulting. The earlier workings were in the diabase and outcropped at surface, where only a small portion of the sill had been eroded. Upon passing through a Keewatin section, however, work prosecuted in the underlying diabase proved that "silver ore occurs at greater depth from the present surface, depending roughly on the Keewatin-diabase contact, where the silver ore occurs in the upper portion of the diabase sill in proximity to the contact."

Such is the judgment of Dr. Miller and Mr. Burrows. The greater significance of the faulting conditions is apparent in the other or "Flynn" vein system of the Miller Lake-O'Brien where—

"The first ore was encountered on the 350-ft. level. A long east and west drift had crossed a very pronounced north and south fault, dipping 50 degrees east, and a northerly cross-cut had intersected No. 6 vein, which was followed to a second fault, striking east and west and dipping 30 to 40 degrees north. Ore was found in No. 6 vein above this fault. From this discovery the development was extended to a number of veins, the principal of which are No. 6, No. 7, No. 7 N.W., etc., producing the greatest width of high-grade found in the mine, of high-grade silver, smaltite and calcite. Later, in drifting on No. 7 vein on the 350 ft. level, portions of it were high-grade, ore two feet wide. In this rich section of the 'Flynn' system the stope was 14 feet in width, in places, of high-grade veins and mill rock. Development in this part of the mine threw light on the ore relationships. The workings show that the high-grade ore two feet wide. In this rich section of the the veins themselves became more indefinite, branching into stringers carrying galena, copper pyrites and other common minerals."

The lucidity of this description of the structural features at the Miller Lake-O'Brien, and the service rendered to the holders of ground in this locality by the management of this particular property, should have a larger appreciation. Perhaps the owner of the Miller Lake-O'Brien has felt he was not conducting an educational course at his own expense for the benefit of the populace in interest. He took over the Millerct when its owners had about exhausted their high-grade in the conglomerate. With ordinary working capital, the Miller Lake-O'Brien might have been upon the deferred list—and there would have been nothing but spasmodic shipments from the Montreal river district as a whole. Southeastern Coleman having elucidated the idiosyncracies of such contacts and faultings, the funds individually supplied by Mr. M. J. O'Brien proved to be an investment in behalf of all those having acreage in and about the sills—it now looks as if there is more than one sill. As at the Castle property, nearby, the relationship of faults and contacts—the vagaries of mineral contents of closely connected veins—have been profitably educational—and elements of certainty supplied—where Keewatin and diabase are present. One Castle experience in the diabase alone, was disappointing. Another effort under contact conditions resulted in finding high grade and milling rock—which need not be as good as they are at the Miller Lake-O'Brien to be good enough for extended operations.

So the "smaller" area that was inferentially deplored by the Mining Recorder in 1910 as the sole center of activity pioneered and piloted the owners of the larger area throughout the sill who await working capital. All things borne in mind, however, the production of almost 6,000,000 ounces may be regarded as an introductory chapter, once adequate money is available and transportation facilities are improved. Along the contacts there are evidences of precious metal mineralization.

Gowganda ridge, so called, was somewhat of a flash-in-the-pan. The Mann-Ryan no longer is in the limelight, although it was the object of competition during that winter when the nimble Foster rushed laden teams to that property. The Boyd-Gordon and Reeve Dobie fluttered and fell. The Bartlett had an inglorious if not unsavory career. The Armstrong Fraction blossomed into "Silver Limited"—and went to the scrap heap. All the "arms" Gowganda lake could muster were unstretched for public monies — but have not made any return worthy of mention. The Miller Lake-O'Brien remained the Casabianca, as it were, before the Castle joined it and re-attested the merits of the dia-

base sill in contact with the Keewatin. Consequently, the contention of Montreal river pioneers, that "we have 'bloom' and calcite", has been varied—and now there is more significance in the statement that "we have the contact". Otherwise there are merely tantalizing silvers, smaltite low in silver content, "galena, copper pyrites, niccolite and other common minerals".

Having followed the events of those years in which the Montreal River claim-holders floundered in a maze of mismanagement and official indifference toward transportation handicaps, the wonder is the slightest optimism prevails outside of the O'Brien and the Castle properties. Nine miles of road from Elk City to Long Point—the "rocky road to Dublin" from there to Gowganda—are the sum total of Government solicitude since the branch line was constructed from Earlton to Elk City. How much the nine miles of road have cost, is not a tribute to the sagacity or business capacity of those who projected and built it. If the section afforded the bonanza grade of Cobalt's outcrops, hauling bullion to the railway, or the establishment of concentrators and refineries on the spot, might be possible—but teaming in the circumstances is permissible for only the Government — with time and money beyond consideration. Of course the road as it is, favorably compares with the heavy gradients and hog's back of the earlier route via Silver Lake; but claim owners have been so long in suspense they are in a quandary as to whether they will have to take their chances with an highway suitable for wagons and tractors, a narrow-guage light railway—or cling to the hope that they will have a standard-guage extension from Elk City. Minister of Mines Mills during a reeent visit to Wigwam, put it squarely before his audience whether they preferred an automobile road to a light railway. Fearing the latter would preclude a standard guage later on, those interested were divided in their views, the impression being that the temporary expedient of a road that will serve immediate purposes is more to the point than a narrow gnage affair would be as a finality, necessitating trans-shipments. Moreover, the Government having made it clear that no official monetary assistance need be expected for a railway of any sort, those who survived the cost of claim licenses and prospecting, recording fees, surveyors charges, rentals—to say nothing of paying for what was required to ereet camps and timber workings—have all the chills and fevers of anticipation without realization. Meanwhile the cherished Temagami Reserve—timber and game preserve—bears eloquent testimony to the short-sightedness of those who aimed to make a mining section in Arcadia —where there would be no fires and strict observance of game laws. Between Kenebeek and Shining Tree what merchantable timber is standing, is pretty thoroughly burned or scorched—and claim-holders unable to procure capital are sufficiently singed to be ready for broiling or other esculentary purposes. They paid for their own bonfires — and are steadfast in their belief in whatever contains favorable contacts.

In the strictly diabase areas, removed from geological conditions as they exist at and around Miller, Leroy, Everett and neighboring lakes, the outcome is enshronded in doubt. Both the Miller Lake-O'Brien and the Castle—the latter controlled by Tretheway Mining Company of Cobalt, entailed an expenditure denied to others. They are at the northwest of Miller lake and near Everett Lake, the latter being where the Castle after prolonged effort on one area had a stroke of luck in 1919 on Claim R.S.C. 101, from which a first shipment of high grade was made in December of that year. Prior to that the Castle company had done 1,217 feet of cross-cutting, 1,335 feet of drifting, 80 feet of sinking and 40 feet of raising-in the strictly diabase area—and "no ore body of importante was encountered in those workings." On the other hand, hand, the richer discovery, near Everett lake, necessitated only the sinking of an incline shaft to a depth of 109 feet on a vein and there was high grade all the way. Continued development improved the status of this ground. This, as much as anything else, gave fresh impetus to the locality—and it is not to be lost sight of that O'Brien and Castle called for capital with nerve and persistence.

About that time it was thought the Crown Reserve Company, which held on option on the Walsh property on the west side of Miller lake, would be added to the list of shippers. The terms were onerous, the parties to the agreement did not see eye-to-eye, and Mr. Burrows in his review of the situation thereabouts says: "A shaft was sunk to the 200-ft. level with drifts on veins on the 100 and 200-ft. levels. Some small lenses of silver ore were encountered on the 100 feet level." Ordinarily common sense might have dictated an amicable arrangement by which the Walsh could have been developed beyond the fault encountered by the Crown Reserve management. A purchase price of $100,000 and 30 per cent. of the gross production, or something like that, left no alternative to those who where spending their money to ascertain the merits and dimensions of the section. Without the high grade for which Cobalt was noted in its palmy days, this Walsh agreement would have been too one-sided. Even with high grade the terms could not be entertained—for which there is the experience to go by of those companies at Cobalt which were subjected to Temiskaming & Northern Ontario Railway and Provincial royalties — royalties which had to be abandoned before the companies could operate at a profit that would satisfy the working capital. That the Walsh is largely in Miller lake is all the more reason why its development cannot be undertaken by other than those well-prepared for a continuous performance until as much has been accomplished as was necessary at the Miller-Lake-O'Brien and the Castle.

North of Miller lake and around Leroy lake is deserving of more attention than it is receiving. On the west side of Leroy lake the so-called Collins property is being slowly developed by a shaft that is reaching toward the lower contact. Some native silver has been noted. Near the northern outlet of Leroy lake the Dodds property has been taken over by the Silver Bullion company which located an encouraging ore body under contact conditions. A shaft started on an island cut this vein and as it carries native silver, the local faulting makes it all the more interesting. Recent opinions by competent engineers have been favorable to the Dodds as an attractive prospect and one of the things which may do better when depth is attained and the contact rocks are exploited. At any rate such properties as the Dodds, Collins, Chapelle and Symmes-Young are on the roster of the eligibles—but it is obvious they cannot become mines, if the ore is there, without aggressive development and more advantageous operating conditions.

Of the Gowganda lake area on the western end of the diabase sill and the Wigwam-Lost-Calcite lake area on the eastern or footwall end of the sill, there is

little to be written. Geologists insist the sill or sills as presented might be made the object of a series of "Great Adventures," as the erudite Rickard will have it. Local sentiment is averse to the idea of "straight diabase" being at all felicitous. Geologists and engineers accustomed to work out contact situations — uninfluenced by the absence of Kerr Lake and King Edward high grade at out-crop maintain that a diabase sill anywhere is a legitimate speculation — for those who can afford the risk.

Unfortunately the operations of several companies have not been reassuring, Bishop, Calcite, lake and Kell, have not been reassuring, however, inconclusive. A rich shoot was found at shallow depth at the Kell. The Bishop workings have high grade in places, and its vein system extends into the Sanderson areas. At the Powerful, merry-go-round tunnels, winzes, etc., have not been productive of glowing reports. The Calcite lake, or Caleta plant is in an advanced stage of decadence.

Sill, sills, or the silliest cannot alter the fact that there has been no "recurrence of the Cobalt boom of 1906"; that the Gowganda area may have more than is revealed and that if owners revised their standards of value they might not continue to "chew the end of sweet and bitter discontent."

Withal, and if these are to be more mines, the other half of the wagon road to Gowganda should be completed within the next thirteen years.

Northern Ontario Letter

THE SILVER MINES.

The Cobalt Field.

At the end of the third week of August, the quotations for commercial bar-silver had reached 62 cents per ounce. Allowing for premium on United States funds, the producers were marketing the metal for the equivalent of a little over 68 cents per ounce in Canadian currency.

Prior to closing down, the cost of producing silver at the McKinley-Darragh mine had reached a little over 80 cents per ounce. At that time, the efficiency of the worker was at its lowest ebb and the cost was at the peak. It is now a matter of record that efficiency has increased a great deal at the mines which continue to operate, the cost of material has declined very materially and lower wages are being paid. These facts lead to the belief that the cost of producing the metal at the McKinley-Darragh would be sufficiently low at the present time to allow the Company to make moderate profits. At the same time, however, it is believed the management intends to play safe, and await some further adjustment before resuming general operations. This holds true of the Temiskaming and the Beaver Consolidated, where the question of starting up is believed now to be only a matter of time, depending upon the opinion of the directors.

By treating an average of upwards of 600 tons daily, and on account of lower costs of material and lower wages, the Coniagas has succeeded in reducing the per-ounce cost of producing its silver. The full details of the operation are not available, but it is learned that production from the Coniages for the fiscal year to end Oct. 31st, will be the highest for any one year since the twelve-month period ended Oct. 31st, 1916.

The Daily Nugget, which has been printed in Cobalt since 1909, is to be removed from Cobalt to North Bay and will be printed as a morning paper after September 17th. The name of the paper will not be changed.

The municipality of the town of Cobalt is addressing an appeal to the Ontario Government for the purpose of deriving more of the revenue which the Government collects from the mines in the form of taxes. The once very prosperous "silver city" is now burdened with a tax rate of 59 mills and is casting about for some means of deriving the revenue required to "carry on."

The shaft on the Haileybury Frontier property in South Lorrain is nearing the 300-ft. level at which point it is planned to carry on lateral operations for the purpose of locating the downward continuation of veins which carry encouraging silver values at surface.

Considerable interest has been aroused among the original shareholders of the Bailey Cobalt Mines with respect to the "winding-up" arrangement as officially stated in the "Journal." The allotment of stock in the newly incorporated Bailey Silver Mines will place the stockholders in a position to share in whatever net profits may result from the joint operation of the Bailey mine and the Bailey customs Mill, formerly known as the Northern Customs Concentrator.

Production from the Mining Corporation of Canada is coming largely from the Buffalo mine. The ore on this property occurs over considerable width and the mining costs are therefore reduced to a minimum. Advice from the west points out that the Mining Corporation has not yet taken any steps to operate the Flin-Flon mine, although the Corporation is stated to be endeavoring to enlist the support of additional British capital with which to develop and equip the Flin-Flon in a manner commensurate to its size.

Elk Lake and Gowganda.

The Elk Lake and the Gowganda districts stand at present in approximately the same condition as they did five years ago. Work is being carried on in a limited way at isolated points and encouraging results are reported. One promising feature is that the more normal conditions now setting in are serving to create encouragement for property owners to go ahead with more exploration and development work. Plans toward this end are under consideration in a number of instances and the indications are that the sleigh roads of the coming winter will be taken advantage of to get in supplies for the exploration of properties which have lain in idleness for a number of years.

Interesting developments in connection with the affairs of the Trethewey Cobalt Company are expected within the next few weeks. It is learned that the annual meeting of the Trethewey is to be held on the same date with the Temiskaming and the McIntyre-Porcupine. Officials of these two other companies have shown considerable interest in the Trethewey's venture on the Castle property in the Gowganda district, and the opinion is being expressed in mining circles that J. P. Bickell, president of the McIntyre as well as the Temiskaming has in mind a scheme to involve these two companies with the Trethewey in its Gowganda venture.

Mr. Bickell was among the original owners of the Castle property prior to its sale to the Trethewey. The treasury of the Trethewey has been running quite low while the opposite is true of the Temiskaming and the McIntyre.

Further discoveries of hematite iron are reported in the townships of Morel and Yarrow and added optimism has been created among interested in that area.

During the month of July, four Cobalt companies shipped ore over the T. & N. O. Railway, according to

Arthur A. Cole, mining engineer. The Coniagas was the heaviest shipper with 70.25 tons, while the La Rose Consolidated sent out 43 tons, the O'Brien 32 tons and the Kerr Lake 22.59 tons, making an aggregate of 167.84 tons. Of this total, only 54.59 tons went to smelters in Canada, the balance of 113.25 tons going to the United States.

The price of silver during the month reached a low of 58.500 cents per ounce on July 2nd, then touched the high point of 62.375 on July 28th, the average for the month being 60.260 cents an ounce.

During the week ended Aug. 19, the Coniagas was the only company to ship ore from Cobalt, this concern sending out one car containing approximately 86,973 pounds of ore.

During the corresponding period, the Nipissing was a heavy shipper of bullion, the total for the week from this mine being 83 bars containing 111,863 ounces of silver.

THE GOLD MINES.

The entire district of Temiskaming, at least at practically every point where gold finds have been made at one time or another during the past dozen years, the country is alive with activity. This situation is in sharp contrast to the conditions of only a year or so ago.

Instead of the central part of the Porcupine and the Kirkland Lake fields having a monopoly on all the activity in the gold mining districts, these two fields have now so broadened out as to make it difficult to define their limits while in the newer areas there is a steady increase in the amount of interest and each week finds new exploration work being commenced.

Whether at Porcupine, Kirkland Lake, Fort Matachewan, West Shining Tree, Lightning River, Larder Lake, Boston Creek, Skead Township, Bourke's Siding, Matheson or Munro the trend of attention is all the same—that of the exploration for or the development of gold-bearing veins.

Even in the Night Hawk Lake region where the discovery of gold a decade and a half ago led to attention being first turned to the Porcupine district, exploration work has been re-commenced and the use of the modern drill is being taken advantage of. This lies nearly a score of miles east from the producing part of the Porcupine district. Then, turning to the west, at a distance of about 25 miles from the producing part of the Porcupine district a considerable amount of work is being done, one company known as the Union Mining Corporation havig already carried operations to a depth of 260 feet and even now considering preliminary plans in connection with erecting a mill.

In the township of Deloro which comprises a portion of the southern part of the Porcupine field and where some of the earliest Porcupine discoveries were made, the stress of adverse economic conditions caused practically every proterty to close down before their value could be determined. Trails were allowed to grow up with underbush, and the property owners were obliged to simply bide their time. The turn having now arrived, this section of the Porcupine field is again becoming active.

As a result of the farflung gold-mining effort now being put forward, added thousands of men will gradually find employment, added capital will be encouraged to enter into the business of gold mining and added millions of gold will be produced. Prospectors, workers, capitalists, stockholders and the country alike will share in the prizes that lie in store.

A most remarkable feature is the absence of excitement. Individuals and companies are right down to earnest prospecting and exploration and there is less of the careless claim-staking than for many years. Capitalists are getting a genuine run for their money, the prospectors are basing their hopes on merit of their property rather than upon waves of excitement and in every respect the gold mining industry as found in Temiskaming has taken on all the aspects of permanency.

The Porcupine Field.

During the month of July the Hollinger Consolidated treated an average of approximately 3,200 tons of ore daily. Working forces have now reached a total of not far under 1,700 men and total income exceeding $900,000 monthly. Income from Jan. 1st to July 31st having amounted to $5,126,050. it is obvious that the total for the full year may exceed $9,000,000. This achievement is all the more remarkable for the reason that during the winter months the mill was operated at only about half capacity due to a shortage of hydro-electric power.

Progress in connection with the proposed consolidation of the Dome Lake with the West Dome is comparatively slow. There are certain terms upon which an agreement has not been reached, but it is intimated that the prospects are favorable for mutually satisfactory arrangements being made. In the meantime, the deal is holding fire. It is stated in well-informed circles that should the consolidation go through as planned, no difficulty is anticipated in being able to raise from $150,000 to $200,000 with which to place the properties on a reducing basis.

Favorable reports are current with regard to underground developments on the Porcupine-Keora, but no official confirmation has been secured. It is known that a wide mineralized body has been opened up, but the question of whether the gold content is sufficiently high as to make it of commercial grade, or not is still uncertain.

Tunnelling operations are proceeding on the Big Dyke property in Deloro township, and the vein will be reached within the next few days.

Cross-cutting is proceeding at the 150-ft. as well as the 300-ft. level of the Beaumont property, formerly known as the North Davidson. These cross-cuts are being driven for the purpose of locating ore bodies which were previously indicated by diamond drilling.

The officials of the Northern Canada Power Company have reiterated their statements to the "Journal" that they anticipate no diffienlty this year in connection with being able to supply ample hydro-electric energy to operate all the mines of the Porcupine field at full capacity.

Taking into account all conditions, it seems probable that it will only be a matter of a short time, probably not later than the coming spring at worst, when all the mines of the Porcupine district will be in operation. At present, the Hollinger, Dome and McIntyre are producing an aggregate of well over $1,200,000 monthly and by next summer will produce an aggregate of about $1,500,000 monthly, taking into account the big increase being made to the McIntyre plant as well as additions to the Hollinger. Added to these three may be the mills of the Porcupine V.N.T., the Schumacher, Northerown and the merged properties of the Dome Lake and West Dome.

Among the properties in the development stage which will be among the active operations are the Allied Porcupine, Porcupine-Keora, Gold Reef, Beaumont, Goldale, Big Dyke, Clifton-Porcupine, March Gold, Triplex, Union Mining Corporation, Gold Island, and Hayden-Porcupine as well as others.

Arrangements are being made by officials and interested parties in the Lightning River Gold Mines to make a trip to the company's properties during the current week. The trip has been encouraged by reason of the promising gold discovery recently made on the company's claims in the Lightning River district.

The work of de watering the underground workings of the Hattie Gold Mines in the Matheson district is under way. The recently purchased second-hand plant is to be installed and an aggressive campaign of exploration and development work has been mapped out.

At Boston Creek, the Miller Independence mine is being explored by using a diamond drilling machine at the 500-ft. level. The drill core is revealing an interesting geological condition. An intrusion of porpryry formation has been encountered and officials of the company are of the opinion that this may bear some relation to the mineral deposition. The drilling is being done for the purpose of locating the downward continuation of the rich ore-body which was opened up near surface in an inclined shaft.

Kirkland Lake Field.

Higher mill heads at the property of the Kirkland Lake Mining Co. have made it possible to establish a very satisfactory rate of net profits. The more favorable labor supply, coupled with a steady increase in efficiency is placing the mine in condition to assure milling operations at full capacity of an average of 150 tons of ore daily.

Enlargements to the mill on the Teck-Hughes are reported to enable the company to produce upwards of $1,500 daily. The physical condition of the mine is strong, the ore already developed above the 600-ft level being sufficient to keep the plant running for a number of years, and with probabilities of these bodies extending to much greater depth.

The Lake Shore mine continues to treat high grade ore, the average recently having been around $27 per ton. It is believed that the question of further milling additions has been deferred until next Spring at least. The Company's decision to disburse two dividends of 2 per cent each during the last half of the current year has given rise to the belief that no further construction is anticipated for the present. The physical condition of the Lake Shore is said to be the strongest in its history.

In Lebel township, work is going ahead on a number of promising prospects, and the results obtaining are such as to encourage the belief that this part of the Kirkland Lake field will contribute additional producing mines to this area.

At the Argonaut Gold, twelve miles east from Kirkland Lake, work is being centered at the 350-ft. level. The manager John W. Morison, declares that the amount of commercial ore in sight is being steadily increased and that in addition to developing the present known bodies, a plan is being arranged to extend lateral work so as to open up ore bodies which were indicated by former diamond drilling

TORONTO MINING QUOTATIONS.

Quotations on Active Stock on Standard Stock Exchange on August 24, 1921.

Silver	Ask.	Bid.
Adanac Silver Mines, Ltd	2	1½
Bailey	2¼	1¾
Coniagas	1.60	....
Crown Reserve	10	7
Foster	3	1
Mining Corp. of Can.	1.15	1.00
Temiskaming	....	22
Trethewey	....	9½
Gold.		
Atlas	19	....
Dome Lake	7½	7
Hollinger Cons.	7.25	7.20
Keora	11	8
Kirkland Lake	37½	37
Lake Shore M. Ltd	1.24	1.22
McIntyre	1.98	1.97
Moneta	12	11
Porcupine Crown	15	14¼
Porcupine V.N.T.	17	16½
Preston East Dome	3	2
Schumacher	....	20
Teck-Hughes	14½	14¼
Thompson Krist	5	4
West Dome	7¾	7¾
Oils.		
Petrol Oil	23	20
Rockwood Oil, Gas	3	....
Vacuum G.	5	4½

METAL QUOTATIONS.

Following are the fair average prices for ingot metals (in less than car-loads):

	Cents per lb.	
Montreal.	Aug. 17th.	Aug. 24th.
Copper, electric	17¼	17
Copper, casting	17	16¾
Tin	33	32½
Lead	6¼	6¼
Zinc	7	7
Aluminum	29	29
Antimony	7	7
Toronto		
Copper, electric	17	17
Copper, casting	16¾	16¾
Tin	35	35
Lead	6½	6¾
Zinc	7	7½
Aluminum	28	27
Antimony	9	9

TORONTO COAL PRICES.

Toronto, 24th August.—There has been quite an increase in the demand for lump coal during the past few days, which may be the beginning of better things. Slack is still at its former price of from $1.75 to $2.15 a ton, while the price of lump remains unaltered at from $2.50 to $2.85 a ton. The demand for anthracite which has been noted as showing an increase in the last two or three weeks, still keeps up, but it is not yet of the dimensions which one would normally expect at this season of the year.

PERSONALS.

Mr. Oliver Bowles, of the staff of the U. S. Bureau of Mines, has been assigned to study means of stimulating production of slate. Mr. Bowles is a graduate of the University of Toronto. Before joining the technical staff of the U. S. Bureau of mines he was instructor at the University of Minnesota and at the University of Michigan. His work has been chiefly in connection with non-metallic minerals.

Mr. Walderman Lindgren has returned to New York from Bolivia. Mr. Lindgren is well known in Canada as well as in the United States as a leading authority on gold deposits.

B. G. Dann, who for the past four years has been connected with the Engineering Department of the Truscon Steel Company in Youngstown, Ohio and New York City, has resigned to accept a position as Manager of the New York Office, 30 Church St., of the Hendrick Mfg. Company, makers of perforated metals, etc. Mr. Dann is a graduate of the engineering department of Lafayette College.

Mr. A. H. Low is at Fort Norman surveying the property of Mackenzie River Oil Fields Ltd. and selecting drilling sites.

Mr. T. A. Link is in charge of the field work of the Imperial Oil Co. at Fort Norman. He went in by aeroplane.

Mr. W. S. Dyer of the staff of the University of Toronto has returned from Fort Norman. Accompanied by Mr. Henderson and Mr. Wm. Ogilvie he made the trip to the oil fields in a small motor-driven boat. This party was one of the first to reach the field this Summer.

Mr. Allan Crawford of Toronto, a third year student in the department of chemistry and mineralogy at the University of Toronto will leave Seattle on August 20 for Norse, Alaska. From there his party will proceed to one of the islands in the Canadian Arctic and undertake scientific and exploring work for the Stefansson Arctic Exploration and Development Co. In July 1922 Mr. Stefansson is expected to arrive there with a large exploration party. Part of Mr. Crawford's duties will be the laying in of supplies for the main expedition.

NEW CRAWLING TRACTOR CRANE.

Industrial Works, of Bay City, Michigan, announce that they have augmented the crane family for which they are noted by the addition of the Type BC crawling tractor crane. They have developed this crane to meet the need for a full-revolving tractor crane which can be developed independently of rails.

The crane is built in two types—the type BC with a capacity of 2,000 lbs. at 12 ft. radius equipped with continuous crawling tractor belts—the Type BT with a capacity of 18,000 lbs. at 10 ft. radius equipped with four broad gauge tractor wheels.

Enlarging Kenora Mining Division.

The Kenora Mining Division has been enlarged to take in that part of the district of Patricia west of the extension of the Thunder Bay boundary line. Beginning August 6, the recording of claims in western Patricia was transferred from Toronto to Kenora. This will be more convenient for the prospectors in the area north of the English river where gold discoveries have recently been made.

EDITORIAL

EDITORIAL CHANGE.

With this issue the direction of the *Canadian Mining Journal* will change, and the retiring Editor asks for his successor a continuation of the assistance of readers and contributors that has been so generously extended to him during the past two years.

The successful publication of a periodical such as the "Journal" is essentially a problem of obtaining first-hand descriptions of technical processes and mining news from those who are numbered among the mining men of Canada, and the duty of an editor has been well defined as consisting in getting others to write, and not in writing himself.

It is perhaps not realised how small a field the mining industry of Canada really is. The typical Englishman who asks a friend going to Halifax, Nova Scotia, to call upon his other friend in Winnipeg is after all not so far wrong in his ideas of community interest, although he may be the holder of curious notions on transportation. There is far more likelihood that a mining man in Halifax will know his *confrère* in Winnipeg than that the English miner at Redruth will know his fellow in Leeds. The mining men of Canada, of all sorts and conditions, probably do not exceed 70,000 in number, and the proportion of those who read technical periodicals will represent a much smaller number. The membership of the Canadian Institute of Mining and Metallurgy, which now stands at its highest recorded number, does not probably exceed 1,700 persons, not all of whom are resident in Canada, but among this number there exists an intimacy and a freemasonry that is probably unexcelled. It is therefore evident that the number of available contributors to a technical periodical of limited national scope is not large, particularly when the reluctance of many technical men to write is admitted. Under these circumstances, we desire to thank those who have assisted in giving a national complexion to this journal by their contributions and personal advice, and would ask to be permitted to point out that a national mining journal in Canada is only possible through the assistance of the mining men of Canada.

The technical journals of the United States are excellent publications, backed by wealthy publishers, and, in recent years, actuated by the consciousness of increasing importance in the world relations of the United States, the leading technical papers of that country have shown wide catholicity in their choice of matter, and have indeed taken the world for their parish. It is natural that Canadian publicists should avail themselves of the prestige and wide circulation of these papers, which are a necessary part of the magazine library of the man of affairs, but we would ask consideration of the national technical publications of Canada from Canadian writers, and, in doing this, desire again to express appreciation of those of our contributors who have supported this periodical. The field which is open to the mining publications of the United States in comparison to those of Canada is sufficiently indicated by a mineral production of 63_4 billions of dollars against one of 200 millions of dollars, and those who, possibly without analysing the conditions, compare the technical excellence and range of contents of the trade papers of the United States with those published in Canada to the detriment of the domestic publication, may be asked to consider that the excellence of Canadian journals is directly dependent upon the goodwill and aid of the Canadian reading public.

The various government bureaus of the United States, we desire to say, show impartiality in their distribution of public documents, not distinguishing between the periodicals published at home and abroad, and a brief editorial experience has served to increase admiration for the U. S. Geological Survey and the Bureau of Mines, and the willingness of these bodies to serve the technical men of North America with fine impartiality and courtesy.

We desire that no criticism of United States trade

periodicals should appear to be intended by these remarks. They are welcome additions to Canadian sources of information, and the true technician will gather his facts irrespective of their origin, and concerned only as to their accuracy. But journalism, and particularly trade journalism, is as proper and necessary a sphere of Canadian endeavour as the trades the journalist seeks to represent, and it is desired to point out, without any inviduous intent, that technical publications in Canada will be successful and will call attention to their merit and individuality in other countries, to the extent, and only to the extent, that they receive the support of Canadian technicians.

To turn to another aspect of this matter, we have in Canada some excellences that arise out of our limitations, not the least of which is the intimate personal friendship of those who comprise the mining fraternity, which is still small enough to remember earlier and less opulent days, and not rich enough to be "stuck-up" and to manifest unpleasant plutocratic tendencies.

Another thing that adds distinction to Canadian mining literature is that we possess a large country, chiefly unprospected in any intensive manner, which can always yield the elements of novelty and surprise, and which even today almost as was the case a century ago, calls for life in the open and pioneering in untrodden wildernesses. Nothing in modern mining has been quite so much after the manner of Kipling as the airplane journeys to Fort Norman, and the Canadian prospector, hard-bitten as he may occasionally be found, is an incurable romancist, and he is not always quite sure whether his lure is gold or "the wind upon the heath."

The writer fully appreciates the privilege of having directed the *"Canadian Mining Journal"* during a period of mining development as remarkable for its new discoveries as any in Canadian history, and also the many kindnesses he has received from the friends of the paper.

THE NICKEL-COPPER INDUSTRY.

The announcement that production of nickel at Sudbury will be temporarily discontinued, while not coming as a surprise, will be the cause of much concern to a large number of people interested in the nickel industry. The operations of the International Nickel Co. are of great importance to the people of the Sudbury district and to the Province. The Creighton mine is the world's greatest nickel mine and is one of the best mines of any kind in Canada. The smelting plant at Copper Cliff and the refinery at Port Colborne are of great industrial importance. That these works must now all stand idle for some time is very unfortunate, particularly for the employees and those in business which depends on activity in the mines and metallurgical works.

It has been well known for several months that the marketing of nickel and copper has been so difficult that operations could not long continue at even half the rate of the past few years. From time to time the working forces have been cut. Some months ago the British America Nickel Corporation discontinued operations, but the older companies being in much better financial circumstance have managed to continue production on a much reduced scale. Now the biggest company has shut down and only the Mond is operating, at far below capacity.

Under any ordinary conditions the International Nickel Co. had little to fear from competitors. The present situation arises from the continued depression in industry. Large quantities of nickel and copper are waiting for a market and it very uncertain how long the producer must wait before conditions will warrant resumption of operations.

It is difficult to get any clue as to how long the steel industry will remain dull. It is worth noting however that such an authority as Judge Gary states that the outlook is not discouraging or doubtful. He says that sentiment is growing better and that there are many good reasons for believing conditions are improving. As most of our nickel goes into use in the form of nickel-steel it is possible that the closing of the mines for a few months will result in material reduction of the quantity of unsold nickel on hand. At present the output is evidently too much for the market, in spite of the fact that it is far below normal.—R. E. H.

RENEWED INTEREST OF BRITISH CAPITAL IN CANADIAN MINES.

The visit of Sir Archibald Mitchelson and his party to Northern Ontario mines is of some significance, if it means that English capitalists are becoming interested in a country where a few remarkable mining successes occurring in a vast territory of monotonously similar geological characteristics suggest that there may be still other and later additions to the goodly company when the north country of Quebec, Ontario and Manitoba has really been intensively prospected.

So far, English investment in the mining districts of the central Canadian north has not been large, in comparison with British Columbia for example; and a reference to London standard mining manuals will reveal the surprising omission of mention of many of our most substantial mining companies. This omission is traceable to the location of the head offices of so many of the asbestos, nickel and precious-metal mines of Canada in New York. Because of the close proximity of the northern mining belt to the United States, and the remarkably fine railway service that gives access to much of the developed part, it is naturdal that American capital should be interested in its development, but it should not be forgotten that British capitalists have never been deterred from investment or investigation by considerations of distance or accessibility, and one is tempted to ask why in the past, Ontario has been so conspicuously overlooked in favour of much remoter parts of Canada. We sincerely hope that the investment which it is stated the visiting Englishmen contemplate making in Northern Ontario will be wisely chosen

and one that will prove profitable, as the moment is in many respects decisive as to the interest British capitalists will manifest in Northern Ontario in the future. The great stretch of country between the Mattagami and the Nelson contains here and there valuable minerals, some of which have been worked to great profit, and some of which have been merely indicated. If British capitalists can be persuaded to investigate this territory we believe that both they and the country will be mutually profited, but preliminary investigation should be of a very thorough nature.

GOLD MINING DIVIDENDS.

The suggestion is being freely made that as the Hollinger Mines are making good profits an increased distribution to the shareholders should be made, and a bonus, to be regarded as a return of capital, is spoken of.

It is suggested in another place that the Hollinger Mine is making fifty percent profit at current running rate.

We submit that the very vaguest ideas are abroad as to what really constitutes profit in a mining enterprise. The balance sheet of a mining company should show its real value, and if such a sheet were drawn up to cover the anticipated life of a mine, arranging for payment of all development out of revenue (and by development is meant every cent spent in developing a mine and sources of motive power) and for complete amortization of the invested capital by the expected date of exhaustion of the mine, plus reasonable allowance for contingencies and working capital, it would be found that few mines justify any such dissipation of their financial reserves as is indicated by "bonus" dividends, whether camouflaged as return of capital, or otherwise. We believe that so far the Hollinger directorate has sanely conserved its capital accumulation, and that it will probably continue to do so, knowing that there are many capital expenditures yet needed at Timmins, such as provision of hydro-electric power, miners' houses, underground equipment etc., that can usefully and profitably absorb any earnings over and above a reasonable common stock dividend. The value of the Hollinger Mine will be reflected in its shares, as the property develops more and more into a steady dividend payer. The ambition of the Hollinger directorate will be, if its past record is any criterion, rather to establish the market value of the shares and to ensure a long period of payment of dividends, than dissipation of funds that may some day be badly needed. A few years ago we witnessed the pyramiding of inventories, when companies such as Atlantic Gulf & West Indies and Central Leather were embarrassed by apparent millions in their treasuries. Today those millions are "all goned away mit der Evigkeit", and we now recognise that they were paper millions, the result of a good time for certain industries. The good time for gold mining is now here, and although its millions (except in regard to the exchange premium) are not of the paper variety, it should be remembered that in the early years of gold-mining there should be accumulated, the large financial reserves and the mine equipment that is necessary to carry on through the lean times that always follow good times, and also to preserve the dividend-paying ability of a mine through the long period of declining activity that precedes final exhaustion.

The Ontario Mining Association could do no better service to its members than to standardize mine accounts with expert advice so that popular conceptions, and consequent administrative blunders and foolish taxes, could be rectified by actual knowledge of what constitutes profits in mining and what the market value of a developed and operating mine consists of. Not one mining man in a thousand but holds erroneous notions on these two points.

MINING COMPANY REPORTS.

From time to time complaints are made by shareholders in Canadian mining companies that they are not sufficiently informed of the results obtained from month to month in the operation of the mines. Recently there have been more than the usual number of such complaints and it is possible that the result may be the issue of a larger number of reports by some companies that in the past. Some of the recent annual reports have also aroused criticism because they fail to give some of the information which the shareholders expected to find in them. More interim reports and fuller information in annual reports is asked for by some of the shareholders.

The criticisms merit consideration. Many mining companies issue no interim reports and give very little information in their annual reports beyond a summary of production, sales and profits or losses. Some such companies, however, when requested for it, give out information freely to shareholders or to the press and are not so much subject to criticism by shareholders. Other companies give out so little information that the shareholder has real cause for complaints.

It must be admitted that the business of mining companies is better known to shareholders and to the general public than is that of most industrial concerns. Mining is rarely carried on in a secretive way. A shareholder who really tries to find out what his company is doing can as a rule obtain the desired information without much difficulty. Criticism cannot then be fairly directed against mining companies as a class. The few cases where the shareholder has reason to be dissatisfied should not be allowed to appear to be characteristic of mining companies. There is no market tendency towards secretiveness in mining and metallurgical operations and fairness to the companies demands recognition of the fact.

All that seems necessary to meet the situation is that the few companies which have not conformed to the usual practice should give out more information than they

have been doing recently. It may not be necessary for the conduct of the business and may not appear to warrant any expense, and yet the course suggested may be desirable because some of the shareholders consider it valuable and the rest of the shareholders are not likely to grumble at the small cost of compilation and publication of brief summaries of the results of operations over short periods.—R. E. H.

THE buckling of the airship ZR-2 and the subsequent explosion of the hydrogen released from the torn envelope is a reminder of the practical nature of the experiments of Prof. J. C. McLennan of Toronto University for large-scale extraction of helium from natural gas emitted by Canadian wells. While no official statement has been made as to the proximate cause of the regrettable disaster it would appear to have been caused by failure of the aluminium-alloy main girder, but the loss of life was certainly caused by the explosion of the enormous quantity of hydrogen released. If lighter-than-air dirigibles of the size of the ZR-2 are to be built for such ambitions work as crossing the Atlantic it would appear necessary to perfect the manufacture of helium as a lifting medium, for the Hull disaster has proved—at a fearfully high cost—that a hydrogen-filled airship is just as dangerous in peace-time operation as when exposed to the incendiary bullets which first caused serious investigation into the possibility of finding a suitable gas with non-inflammable characteristics for combatant airships. As Canadian natural gas was found to have the largest helium content of any of the natural gases analysed, the matter is one of much interest to this country, for it is not to be expected that the Hull disaster will deter further experiments in the building of large airships, or the eventual coming of the airship of commerce and passenger transportation.

RECENT GEOLOGICAL SURVEY REPORTS ON BRITISH COLUMBIA.

Part "A" of the Summary Report of the C. G. S. for 1920 consists of eight interesting reports on British Columbia districts, the most important of which from a current economic view point is W. E. Cockfield's note on the silver-lead deposits of the Keno Hill area, near Mayo, in the Yukon Territory. Much activity has been displayed in this area, and from time to time reports of development have appeared in this journal. Some 600 claims have been staked on Keno Hill, but serious development work has only been done on two or three groups. The most active company is the Yukon Gold Company, and other active operators include Messrs. McKay and Erickson and the Rasmussen interest. The ores at superficial depths are high-grade, most of them rich enough to pay for mining by hand and to stand shipping without concentration. The transverse fissures, in which most of the ore so far mined has been found are short and unlikely to continue to great depths, but the longitudinal veins are more likely to prove continuous with depth. The area has not been prospected to sufficient depth to determine the extent and persistence of the ore. An elaborately contoured map of Keno Hill, with an ideal cross-section accompany the report.

S. J. Schofield and George Hanson report on a continuation of study of the geology of the Salmon River district commenced by J. J. O'Neil in 1919. The conclusions and summary are as follows:

The ore deposits fall into three main groups:

(a) a low-grade, complex type, with values in the base metals, copper, lead, and zinc. (Big Missouri, Hercules, Forty-nine, etc)

(b) a type rich in silver minerals, including tetrahedrite, freibergite, pyrargyrite, argentite, and in some cases native silver. (Premier, Silver Tip, certain ore-bodies in Forty-nine, Big Missouri, and Mineral Hill.)

(c) a pyritic siliceous type, with high gold values. (An ore-body in Premier mine).

The most favourable associations for the occurrence of ore are as follows:

(a) in the quartz porphyry.

(b) at the contact of the quartz porphyry with the tuffs.

(c) in certain beds of the tuffaceous conglomerate.

The slates in general do not appear favorable for the deposition of ore.

The sulphides rich in silver, such as tetrahedrite, freibergite, argentite, and some of the pyrargyrite are considered to be of primary origin and will continue in depth.

The native silver is considered to be of secondary origin.

V. Dolmage reports on the West Coast of Vancouver Island between Barkley and Quatsino Sounds. Although there has been no mineral production from this region in recent years, gold, copper, iron, marble and manganese occur. Shipments of copper are expected from the Tidewater Copper Company's mine at Sidney Inlet.

The Coquihalla area is reported on very fully, about twenty pages being devoted to C. E. Cairnes's report. Gold is the chief ore mineral of economic importance in this area, the Emancipation Mine being best known, and situated about 1,100 ft. above the Kettle Valley Railway in typically rough country. The greater part of the area is devoid of trails, and this fact, combined with dense vegetation, a high timber-line and mountainous characteristics, explains the backward development of the mineral areas. In addition to gold, silver, silver-lead, copper, molybdenum and manganese are noted as occurring.

Of much economic bearing is J. D. MacKenzie's report on the limonite deposits of the Taseko Valley, of which it is hoped to give more detailed particulars, with some photographs in a later issue of the "Journal". The report is extremely full and illustrated with a wealth of maps and sections. The limonite occurs however in an area remote from transportation, and in quantities that are not considerable as iron-ore deposits are today regarded, so that its economic importance is not of much importance as had been hoped from earlier and less exact reprts.

Other reports include a reconnaissance between Taseko Lake and the Fraser River by J. D. MacKenzie, on the Entsuk Lake District, by R. W. Brock, and on the Lardeau Map area by M. F. Bancroft.

The Standardization of Breathing-Apparatus Practice

An Address By The British Columbia Minister Of Mines Prepared For An International Conference at St. Louis, Mo., 1st September, 1921, On Mine Rescue Work.

Hon. Wm. Sloan, Minister of Mines for British Columbia, is a minister that has always taken his duties seriously, realising that he was in charge of that department of British Columbia's industrial activities which is of the greatest importance, whether considered historically or in the light of the future. Mr. Sloan has particularly given his official aid to all matters pertaining to the accomplishment of such comparative safety as mining operations will permit, and he has for some time urged standardization of mine-rescue work and types of oxygen breathing-apparatus.

The following remarks have been prepared by Mr. Sloan for delivery at an international conference at St. Louis, Mo., at which, under the guidance of the United States Bureau of Mines, the various questions of training methods and standardization of types of apparatus and the practice of mine-rescue work are to be considered. It is understood that the calling of this conference was first suggested by Mr. Sloan, and the incident is one of many that have taken place that indicate a commendable community of effort and interest among the mining men of the western States, and of British Columbia and Alberta.

Mr. Sloan's address, delivered in his unavoidable absence from the proceedings of the Conference, stated in part:—

In the calling of this Conference the United States Bureau of Mines has added to its already splendid reputation as an organization keeping in close touch with the world's development of the mining industry and especially with that phase having to do with the betterment of working conditions and with the safeguarding of the lives of those engaged in the particularly hazardous occupation of the underground worker.

I am interested in the work for which you are gathered, not only as the Minister of Mines for the Province of British Columbia, but as one whose long residence in one of the chief coal-mining centres of the Province has brought forcibly home the need of the miner, and of the miner's dependents, of every protection that science can afford. It seems clear to me that, while the Bureau of Mines has done much, there still is room for improvement and advancement by an international exchange of ideas among those technically informed and by an international understanding to take the fullest advantage of the product of the world's brightest scientific minds in respect of apparatus and to apply, by common methods, training systems adjudged the best among the miners and other underground workers.

"The Need for Standardization in Mine-Rescue Work" is the subject upon which I have been asked to address you.

After detailing the extent of the cost deposits of British Columbia and their present development, Mr. Sloan stated it was a matter of first importance that the mining industry, of which the matter of coal production is only a part, should be based in point of the development on right principles, not only in respect of practical encouragement and of administration, but as well in respect of the enactment of enlightened policies, first, for the prevention of accident and next for the rescue of those who may be unfortunate enough to be involved despite measures adopted in their interests. As long as there is a mining industry and as long as there is industry of any form, there will be accidents. All we can do is to see that safeguards are kept well ahead, if possible, of our other industrial advances.

Having been in the business for over half a century it follows that we are not unconversant with its problems and our administrative work of recent years indicates I think, that we are appreciative of the value, in this connection, of applying with unflagging perseverance the principles of "Safety First" and of providing the most thorough educational and mechanical facilities in First Aid and Mine Rescue Work.

British Columbia is an epitome of other mining countries. Our problems are the problems found elsewhere where the industry flourishes. We do not claim to be forging ahead while others lag behind. We do not assert that our desire for advance in protective measures is a singular one. It is not contended for one moment that any one mining district has a monopoly of benevolent humanitarian legislation. For our part the fact that this Conference has been called is significant of the unanimity of the wish to get forward to the limit of present mechanical and mental possibilities in the matter of the protection of the lives of miners.

We have had our serious coal-mining accidents. But in this British Columbia is by no means alone. Wherever there is a considerable coal-mining industry there have been similar experiences. The recollection is sufficient to lend force and point to the objects of this gathering and to induce delegates to bend their energies to the task of finding means of working in unison towards the common goal.

I am happy to be able to say that in our Province in 1919 and 1920 we have achieved record low marks in the matter of coal mine fatalities. The ratio per thousand persons in 1919 was 2.013. In 1920, it was 2.67, in the past ten years it has been 4.053. The year 1919 saw the loss of twelve lives in the industry and last year witnessed the deaths of seventeen in the performance of their duties. Creditable as are these statistics in a comparative sense we are striving and are here to solicit advice and co-operation to achieve a clean sheet.

Mr. George S. Rice, of the United States Bureau of Mines, made an examination of the Crow's Nest Pass Coal Field at the request of the B. C. Government. He, therefore, is familiar with one of the most important of the coal fields of the Province.

In addition to many other preventative measures subsequently taken an order was made requiring withdrawal of men from any working place showing a percentage of 2.5 methane or greater. Later it was established that a 5-16 inch gas cap on the Wolf Safety lamp in a Coal Creek Mine equals 2.5 per cent methane, or the percentage necessitating withdrawal and that a ½ inch cap in the Vancouver Island and Nicola-Princeton Districts equals 2.53 per cent of methane. There also was the recent noteworthy legislation the effect of which

will be to introduce into all coal mines of the Province the electric safety-lamp and to eliminate entirely the open lamp in coal mining in British Columbia.

Now to turn to mine-rescue and first-aid work. Although concentrating seriously on the preventative side of our problem, the other branch, that of the salvage of human life, has been receiving every possible attention. The first self-contained breathing apparatus were introduced into British Columbia in 1919, the machines being of the negative-pressure type and manufactured by the Draeger Company. Government stations then were equipped with these machines. In the past four years, however, there has been a marked advance. It was in the latter part of 1917 that the Gibbs apparatus was perfected and tentatively approved by the United States Bureau of Mines. The advantages of an instrument of a positive-pressure type, with an automatic-breathing arrangement, was readily recognised. There also came the Paul and the later types of the well-known English model the "Proto".

At each of the Provincial Government Stations there are competent men employed for instruction in mine-rescue work and in first-aid. They have all the facilities needed to make their work effective. There are installed at the coal and metalliferous mines and government stations in the province 136 sets of mine-rescue Apparatus and 45 resuscitating devices—one mine-rescue instrument for every 40 persons employed underground and one resuscitating device for about every 175 men employed underground at coal mines. There are today in the province over 500 holders of mine-rescue certificates granted by the Department to those who have taken a course of training in this work. Over ten per cent of the underground employees in coal mines in the province hold mine-rescue certificates and nearly fifteen per cent of the total employees have passed examinations in first-aid work.

Until a few years ago comparatively little interest was taken in first-aid work in British Columbia. Proper encouragement, however, gave it the needed fillip. The appointment of an instructor to be at the disposal of those interested and the granting of financial aid were chiefly responsible. Now over 1,200 of the mine employees have passed examinations in this work. The organization of the miners interested into what are termed the Vancouver Island and the East Kootenay Mine-Safety Associations and the recognition of the value of their educational work both by the Government and the operating companies, have been largely responsible for the noteworthy success of this form of constructive and advanced endeavor. Competitions have been held annually under the auspices of these organizations in mine-rescue and first-aid work and the Government has made it a point to grant all financial assistance possible.

Thomas R. Jackson, one of our Inspectors of Mines, in his 1920 report, says:

"I have much pleasure in being able to report good progress in both first aid and mine rescue work. The Nanaimo Western Fuel Company's "Miners' First-aid Team" (Captain Barton) won the Coderre Cup, which can only be competed for by the miners. In winning this trophy and because thy had obtained the highest number of marks for their work, they also scored a higher achievement in the realm of first-aid by winning the Montizambert Cup, representing the championship of Canada, which is open for competition to all classes of labour, under the auspices of the St. John Ambulance Association," .

It is interresting to note that Captain Barton's team, of Nanaimo, B. C., have taken part in the international competitions held at St. Louis, Missouri. In view of their success in Canada it was felt by the Government and the operating companies chiefly interested, who financed the trip, that their devotion to the work and their success in Canada should be rewarded by the opportunity of testing themselves in this broader international field.

The Desirability of International Co-operation.

As we moved from point to point in the fight against mine fatalities the conviction grew on me that it might be possible to formulate some fixed policy internationally, both in respect of mine rescue apparatus and of the current practices for the training of men in its use, that would bring higher efficiency and more certainty of attaining desired results in emergencies.

There was no clear well-defined plan for the reaching of the desired end. Rather it was a feeling that there should not be a multiplicity of types of apparatus. To choose in the equipping of a mine-rescue station was not easy. Tests were held. Reports by technically qualified men were asked for and received. The types bearing the stamps of approval of the U. S. Bureau of Mines were satisfactory but, to one wishing to select the best under all conditions there was presented a perplexing problem. The circumstances seemed to call for some form of standardization. The difficulty of achieving this in the instrument; viz. that any arbitrary fixing of a standard apparatus would tend to the discouragement of scientific initiative, was and is recognised. But it appeared possible, the adoption of an international policy, that there might be a solution of the problem, such a solution as would give to the world a breathing apparatus, reflecting the highest present-day achievement of our scientists and coincidentally encourage the scientist to further improvement. This is one of the important matters I would submit for the consideration of the Conference.

On July 10th, 1920, there was an accident in No. 2 Mine, Pacific Coast Coal Co., Washington State. Three men, each wearing Mine Rescue apparatus, were overcome and lost their lives. The details of this tragedy are not germane to the question at issue. Two points, however, struck me forcibly in reading the official report issued by the Washington State Safety Board. First, that several models were in use, some old and others new type, and, second, that there was lacking that thorough knowledge of the apparatus that might be expected to lead the wearer to instinctively do the right thing when the emergency arose.

The lessons the Washington Safety Board draws from the accident are significant. They are:

1. That no one using mine rescue apparatus should be allowed to make such a trip except in case of saving life and then only after proper preparation had been made for relief in case of accident to one of the team.
2. That when men are sent in to do rescue work, all men in the party should have the same type of apparatus, that is, one man should not have apparatus with a fixed feed while others have a type that would give them sufficient air to travel or work faster than others in the party.

This emphasizes the need of some action towards standardization. It leads to the opinion that a uniform method of training in the use of recognized and approved apparatus is required. The means of obtaining

this is one of the matters that should be seriously discussed. Certainly the time is ripe for the adoption of a campaign of publicity aimed to place the instruction, at all mining centres throughout the continent of America, on a common basis.

Attention in drawn, in the connection, to the report of a special committee appointed to investigate the advisability of employing a standard form of mine rescue apparatus throughout Canada, an excerpt from which follows:

"Standardization of mine rescue apparatus and the training in the use of the same would result in greater efficiency as well as in greater economy both in regard to apparatus and men.

"In the Dominion of Canada at the present time we have at least five different types of mine rescue apparatus, namely Draeger, positive-type, Draeger, negative-type, Fluess or Proto, Paul and Gibbs, all of which have different parts (necessitating the maintenance of large reserves of these), different methods of circulation in air sysems and requiring different tests as to proofs against leakages.

"This indicates that the methods of training are widely diversified and gives a faint idea of the confusion that is likely to arise should more than one type be brought together in the event of an accident requiring their use.

"The object of mine-rescue apparatus is to enable a person to travel, work or remain for a varying period in an atmosphere incapable of sustaining life, owing to an insufficient supply of oxygen, irrespirable gases, or finely divided solid matter. The apparatus must be air-tight, so that air from the outside atmosphere cannot penetrate to the inside circulation. A number of lives have been lost in using mine-reseue apparatus, especially with the types which have been longest in use, but it should be remembered that constant use is the chief factor in developing machinery; in the case of mine rescue apparatus very little opportunities are afforded for trying them. The result has frequently been that, at the decisive moment, the apparatus has failed to work or the men have lacked the skill to use them. In many collieries, apparatus, necessarily delicate to maintain, is not kept in that state of perfection required for results, and frequently, when the occasion arises for their use, prove to be more dangerous than useful.

"The risks attendant on the use of mine rescue apparatus can only be reduced to the minimum by a proper system of training. Under such conditions, the advantage of a standardized method of training, and especially with a standard mine rescue apparatus, can be readily appreciated. The workman who takes a course of training to qualify him to become a member of a mine rescue brigade shows a considerable amount of self sacrifice and patriotism, for in addition to his ordinary duties, he undertakes a great amount of work, which is by no means of a pleasant nature. Not only does it mean a sacrifice of his leisure time, in qualifying for this duty, but they know that whenever an accident occurs in which rescue work is required, they will be called upon to render assistance, even to the extent of endangering their lives. Not only in the mines where they are employed, will they be called upon to undertake these arduous and dangerous duties, but they may be called upon to do so in other collieries, where their lack of knowledge of the mine workings may add other dangers to the many already present.

"Under these conditions, we feel that standardization of mine rescue apparatus, and mine rescue training, will not only give good results, but will tend to eliminate confusion with its attendant dangers.

"Out of a dozen ways of doing a thing a certain way is the best; when things (let it be training in mine-rescue work, mine-rescue apparatus, or anything else) are not standardized, the result is confusion. The world is gradually awakening to the losses resulting from the employment of so many different working methods for accomplishing identical results.

"One efficient plan, universally followed, is always far superior to a multitude of practices to attain the same end, for in the latter case many of the methods used must necessarily foster waste.

"To attain this very desirable result we feel that it would be in the best interest if the Dominion Government would actively co-operate with the various provinces where coal mining is in operation leading towards an investigation of mine rescue apparatus and mine rescue training."

PORCUPINE-DAVIDSON GOLD MINE NEW FINANCING.

Toronto, Aug. 24. — Details of the arrangements made for financing Davidson Consolidated Gold Mines were made public today after they were ratified at a meeting of shareholders. A new company to be known as Porcupine-Davidson Gold Mines Ltd. will be capitalized at £1,000,000 sterling. The new stock which is paid with the addition of £50,000 cash to the old company is apportioned as follows: £375,000 preferred of which £175,000 is to be subscribed by the new company on completion of the purchase. Of the new common stock £450,000 is to be subscribed by the new company on the completion of purchase and £170,000 to be reserved in the treasury for future use if required. Preferred shareholders will receive two-thirds of the profits until the par value of their stock is paid and then 20 per cent of the profits non-cumulative interest.

The Davidson Consolidated Gold Mines Ltd. will now be a holding company, receiving in exchange for its property £50,000 in cash, £175,000 preferred and £450,000 common stock in Porcupine-Davidson Gold Mines Ltd. The new company will offer £200,000 to the public through Messrs. A. Mitchelson & Co., London at par. The remaining £175,000 common will be in the treasury. The par value of shares will be 5s.

It is stated that of the £200,000 to be provided for working capital £50,000 is already guaranteed and a further £100,000 underwritten and an initial payment of £20,000 has been made. It is announced that dewatering of the mine has already commenced preliminary to resumption of operations within a short time.

SALT WATER IN WINDY POINT WELL.

It is reported that salt water has been encountered in the well being drilled by the Imperial Oil Co. at Windy point on the north shore of Great Slave Lake, and as yet there are no indications of oil. The well is 1,200 ft. deep and it is doubtful whether further work will be done at this place.

PROSPECTORS BUSY IN SOUTH PORCUPINE.

It is reported from South Porcupine that the Mining Recorder there issued more licenses last week than during any previous week since the recording office was established at South Porcupine.

COAL-CLEANING.

("Times" Engineering Supplement.)

Two Recent Developments.

Attention was called by Mr. Robert Nelson at the Civil Engineers' Engineering Conference to the deterioration noticeable since the war in the coal supplied to consumers in respect of the amount of incombustibles contained in it, and he described two processes of recent development which he suggested would in proper combination offer an adequate solution of the problem of cleaning coal.

He stated that 40 separate records from works where a comparison of the ash in pre-war and post-war coal (purporting to be the same class of coal from the same sources) can be directly made indicate that the average increase in the quantity of ash is nearly 63 per cent.: that is, coal that formerly contained 8 per cent. of ash now contains on the average 13 per cent., and coal that formerly contained 12 or 13 now contains more than 20. It has been computed that about 35 million tons of uncleaned slack coal are transported annually in Great Britain, for an average distance of perhaps 50 miles, to be used for steam and manufacturing purposes; and it follows that at least 1¾ million tons of material which is worse than useless are annually transported up and down the country, absorbing labour to load it, to unload it, to fill it into furnaces and to take it out again as clinker. If the whole of this recently added 5 per cent. could be got rid of at the pit head, about 2,000 trucks and 40 locomotives, together with all the man-power released, would be permanently available for some useful purpose.

Froth Flotation.

The chief difficulty in washing coal by the older methods is to deal efficiently and effectively with fine coal. Hitherto, coal-washing has been effected by specific gravity between the coal and the dirt. If the dirt is of the same or nearly the same specific gravity as the coal, these methods fail when applied to material below a certain size. The new flotation process for washing fines coal is, however, independent of gravity. The coal to be treated, if not already fine enough, is crushed until the particles pass through a screen about one-tenth linear inch aperture. It is then mixed with three to four times its weight of water, together with a small quantity of reagent. The reagent may be an oil or coal-tar product, and 1 lb. is, generally speaking, required for each ton of coal treated. The mixture is agitated by a power-driven mechanical mixer, and a multitude of minute air-bubbles is produced. To these the coal particles attach themselves, and by them are floated to the surface of the water in the form of a thick coal laden froth. The coal in the froth is removed by a suitable scraper and dried for use, while the ash-forming dirt sinks to the bottom and is drawn off. Once the proper reagent has been found, the working of the process is simple, and given a steady flow of feed and a regular supply of reagent, a flotation machine, it is claimed, will produce clean coal on the one hand, and on the other a residue which is very nearly coal-free.

Apart from valves and piping and the mechanically-driven mixers and scrapers, the ordinary flotation machine is made entirely of wood. It consists usually of from five to ten "mixing" boxes, each with a froth box connected to it. The material under treatment passes from No. 1 mixing box via No. 1 froth box to No. 2 mixing box and so on through the plant, the final reject coming from the last froth box. A machine to deal with 1,000 tons of coal in a 24-hour day measures approximately 37 ft. by 15¾ ft. by 15½ ft.

Rheolaveur Process.

A process, called the Rheolaveur, for cleaning coal other than fines (from 2½ in. downwards) comes from Belgium. Its first requirement is a strong and steady flow of water. The water is turned into a trough into which the coal to be treated is also led. The flow of water carries the coal along with it, and the separation of coal and dirt is effected by stratification, the rate of the flow of water being so regulated, and the trough made of such a length, as to allow time for the coal and dirt to stratify. Arrangements are made at intervals to draw off the dirt from the bottom of the trough, and the coal is borne along until, at the end of the trough, there is no more dirt to be drawn off, and clean coal is delivered to the clean coal hoppers. at each drawing-off point a cast-iron box is inserted, from the bottom of which a current of water, controlled by a hand-valve, is made to flow upwards into the trough to prevent coal from being drawn off with the dirt, serving a similar purpose to the upward flow of water in the wash-box of the Draper washer. The water is stored in a tank fixed about 20 ft. above the trough and arranged to give a continuous steady flow.

In washing nuts the strength of the upward current in the first box is kept high so as to allow shale only to be drawn off. This shale forms the reject and at once finds its way to the shale dump. In the second box the strength of the upward current is rather less so as to allow the balance of the shale, and it may be a little coal, to pass through the box. This reject is not sent to the shale dump, but is returned by an elevator to the original trough to be rewashed. In washing nuts two boxes only are necessary, and the coal passing the second box, being dirt-free, is delivered via a moving drainage plate to the nut-coal bunker. In washing small coal four boxes and two lengths of trough, one above the other, are needed.

The advantages claimed for the process are low initial cost, low maintenance and running costs, easy control of working, absence of complicated mechanical parts, and economy of space.

STEAMING IN VERTICAL GAS-RETORTS.

A report just issued in London by the Fuel Research Board deals fully with experiments carried on, at H. M. Fuel Research Station at Greenwich, to determine the effect of steaming in vertical retorts. The installation was designed to supply accurate data from which the economic possibilities of steaming could be determined. Mr. George Beilly, Director of Fuel Research, in commenting on the results obtained states that we can now say with confidence that steaming gives not only gain in therms in the form of saleable gas but also in the yields of tar and ammonia. "Some sacrifice in the quantity, and, perhaps, the quality of the coke must be faced, but these disadvantages are more than compensated for by gains in the other products. By moderate steaming at moderate temperature the output in therms of gas is increased and the cost per therm is decreased.

The report gives a full account of the experiments and the results obtained. It is published by H. M. Stationery Office, London. The price is 1s. 6d.

CHARACTER AND EXTENT OF VIRGINIA ANTHRACITE.

The so-called anthracite of Virginia is not really anthracite but is a much softer coal according to the United States Geological Survey, Department of the Interior. The coal mined in some parts of this field compares favorably, except, that its ash content is greater, with the coal from the Pocahontas field, but that from other parts is harder, contains less volatile matter, and consequently approaches anthracite more nearly in general composition. This higher-rank coal, when properly prepared, makes an excellent domestic fuel and during the war found a ready market for this use.

The coal is of lower Carboniferous (Mississipian) age and is found at many places in the ridges of the Appalachian Valley from Potomac River nearly to the Tennessee line. It is best developed, however, in Montgomery, Pulaski, and Wythe counties. It occurs in what has been called the Price sandstone, which outcrops in a narrow belt, dipping south at angles ranging from 20 deg. to 30 deg., at the southern foot of Brush and Little Walker mountains, from a point 6 or 8 miles northeast of Blacksburg to a place almost due north of Pulaski. At that place the outcrop turns to the south, and it pursues a zigzag course around anticlinal and synclinal points to Pulaski, where it passes beneath and is concealed by the Shenandoah ("Valley") limestone. The coal also occurs in Price Mountain, southeast of Blacksburg, where it lies in an anticlinal fold and dips under the Shenandoah limestone in all directions. In Wythe County the coal and associated rocks form an overturned syncline just north of Max Meadows, but its outcrop is largely concealed by a tongue of the Shenandoah limestone that has been thrust over upon it. The coal also reappears at the foot of Little Walker Mountain, northwest of Wytheville, and extends westward nearly to Marion, in Smythe County.

Two beds of coal have been mined in this field, known as the Big or Merrimac bed and the Little or Langhorne bed. The Merrimac bed seems to be present throughout the part of the field mentioned above, with a thickness ranging from 5 to 11 feet, but in every mine the bed contains many shale partings that can be separated from the coal only with difficulty, and consequently the coal as it is put upon the market contains a large percentage of ash. The Langhorne bed is also generally present throughout the field, but so far as known it is thick enough for commercial mining only west of New River and north of Pulaski, where it ranges in thickness from 3 to 5 feet. In that part of the field west of Wytheville the coal beds are generally thinner and more impure than they are farther east.

The chemical composition of the coal is shown by the accompanying analyses. All the analyses represent the Merrimac bed, except that from Little Walker Mountain north of Pulaski, which is from the Langhorne bed.

The analyses show that the most objectionable feature of this coal is its large percentage of ash, which has made it difficult to market the coal in competition with the purer coals of the bituminous fields on the west. If the coal were carefully hand picked and washed the percentage of ash could probably be so much reduced that it could hold its own for domestic use and for raising steam.

The analyses also show that the coal ranges in rank from semibituminous to semianthracite, but that none of it approaches the composition of Pennsylvania anthracite. The rank is determined by the "fuel ratio", the quotient obtained by dividing the percentage of fixed carbon by the percentage of volatile matter. According to the standards adopted by the United States Geological Survey, bituminous coal has a fuel ratio of less than 3; semibituminous coal, 3 to 6; semianthracite, 6 to 10; and anthracite, 10 or more. Those whose fuel ratio is less than 6 should be sold as semibituminous or "smokeless" coals, and those whose fuel ratio is more than 6 should be sold as semianthracite. The present practice of putting them all on the market as Virginia anthracite should not be permitted, as the term is misleading.

An examination of these coals has been made by the United States Geological Survey of Virginia, and the present note is issued to supply information to those who are seeking investments in this field, to operators who are marketing these coals, and to consumers who may wish to know something of their value compared with the standard coals of the country.

Analyses of coal from Montgomery, Pulaski, and Wythe counties.

Location	Moisture	Volatile matter	Fixed carbon	Ash	Sulphur	British thermal units	Fuel ratio
Price Mountain:							
South side	3.6	9.5	67.6	19.3	0.46	11,850	7.12
North side	3.0	10.9	64.2	21.9	0.68	11,670	5.89
Brush Mountain:							
Near Blacksburg	1.9	14.0	68.9	15.2	0.52	12,740	4.92
Poverty Gap, New River	1.6	13.3	61.5	23.6	0.67	11,400	4.62
Little Walker Mountain, north of Pulaski	4.6	10.0	71.3	14.1	0.57	12,520	7.13
Syncline northeast of Max Meadows	3.8	9.4	62.2	24.6	0.75	10,960	6.62

TALK AND SOAPSTONE IN UNITED STATES IN 1920.

Altough talc is a mineral that is most widely known in the form of talcum powder, it is extensively used in the industries. The pure mineral is known as talc and the massive rock that contains it is known as soapstone. Nine-tenths of the talc and soapstone mined is ground and used as a filler in paper and in rubber, as foundry facing, and in many other ways.

The United States is by far the greatest producer of talc and soapstone, and it consumes even more than it produces. In 1919 it produced 68 per cent of the world's supply and consumed 79 per cent.

The production of talk and soapstone in 1920 exceeded that in any previous year both in quantity and in value, according to Edward Sampson, of the United States Geological Survey, Department of the Interior. The sales in 1920 amounted to 224,290 short tons, valued at $3,090,265, an increase in 1920 over 1919 of 21 per cent in quantity and 31 per cent in value. The quantity exceeded by 2 per cent that of 1917, the previous record quantity year, and the value exceeded by 15 per cent that of 1918, the previous record-value year.

The quantity of talc reported to the Geological Survey as ground was 178,505 tons, valued at $2,142,894, or 18 per cent more than in 1919. The value of the ground talc was the highest on record, exceeding that for 1919 by 34 per cent and that for 1918, the previous record-value year, by 15 per cent. The average price of ground talc in 1920 was the highest on record, namely, $12 per short ton, which may be compared with $10.55 in 1918 and 1919 and $8.42 in the prewar year 1913.

The manufactured soapstone sold amounted to 19,707 tons, valued at $709,400, not the highest annual output recorded, but the highest annual value.

Wallace Barnes Company, Ltd., will start the manufacture of springs for the Canadian trade next month in their new factory at Hamilton, Ont., which will be under the management of Mr. T. M. Norton. The parent company is at Bristol, Conn.

NEW BORATE FIELD IN NEVADA.

Deposits of colemanite, a mineral that yields borax, which were recently discovered in southern Nevada, have been examined by L. F. Noble, a geologist of the United States Geological Survey, Department of the Interior, who reports that colemanite occurs in two areas in the Muddy Mountains. One area, known as the White Basin district, lies just east of Muddy Peak, about 15 miles southwest of St. Thomas. Mr. Noble says that the colemanite here occurs in irregular layers interbedded with whitish shale, most of which appears to be composed of very fine, more or less calcareous volcanic ash. In places the shale contains considerable gypsum and thin-bedded limestone, and here and there beds of tuff, some of which is light and pumiceous. Much of the limestone shows concretionary structure and weathers into globular form resembling goose eggs which scale in concentric layers like an onion. These so-called "goose eggs" are of much value to the prospector in locating the horizon of the deposit. Mr. Noble concludes that the deposits of colemanite, some of which contain material whose structure suggests that of ulexite, or "cottonball", were originally formed as ulexite in mud just as ulexite is being formed in the dry lakes or playas of desert basins to-day, and that percolating waters highly charged with lime may have afterward changed the ulexite to colemanite.

The structure of the goose-egg limestone suggests spring deposits built up layer upon layer by evaporating waters highly charged with lime. Volcanic activity in this general region, which is proved by the presence of volcanic ash in many beds, suggests the ultimate source of the boron that formed the ulexite, and the great masses of Paleozoic limestone in the Muddy Mountain Range were doubtless the source of the lime.

The formation that contains the colemanite is known as the Horse Spring formation. This series of beds and the underlying Overton conglomerate are of fresh-water origin and are probably of Miocene age. They rest uncomfortably on older rocks but have been bent and somewhat faulted by folding.

In the White Basin district the layers of colemanite as exposed range in width from a fraction of an inch to a maximum of 2½ feet, and though the district as a whole is considerably faulted there seems no reason to doubt that it contains a large quantity of commercially valuable material. A carload of colemanite has been taken out by the American Borax Co. for shipment from St. Thomas.

The area that contains the largest deposit in the region is known as the Callville district. This deposit was found last December by Lovell & Hartman in the canyon of one of the tributaries of Callville Wash, about 12 miles southwest of White Basin and 6 miles south of Muddy Peak. The bed of colemanite, which forms a part of the Horse Spring formation, has a minimum thickness of 10 feet and a maximum thickness of 18 feet, and its outcrop is visible for at least 3,000 feet along the rim of an eastward-trending canoe-shaped syncline, the east end of which has been made irregular by faulting. The colemanite is interbedded with shales, which lie near the top of a thick series of massive limestones. The horizon of this huge colemanite deposit can be traced all around the inner rim of the syncline for several miles along the outcrop, though colemanite is not visible in considerable amount except in the great lens already mentioned.

The colemanite appears to occur at the same horizon in the Horse Spring formation, both at White Basin and near Callville Wash.

The great deposit near Callville Wash consists essentially of solid layers of colemanite alternating with layers of paper shale or limestone. The bedding in some parts of the shale is wavy and within the "vein" exhibits the typical goose-egg structure, but in others it is regular and parallel. A large part of the deposit consists of massive crystalline colemanite, which, however, is interbedded with shaly material and will probably have to be concentrated. So far as can be judged from the two open cuts already made across it, the deposit or "vein" as a whole may be expected to run at least 30 per cent of pure colemanite and may run as high as 50 per cent.

COL. CURRIE'S IRON FIND.

Further Proof of Intelligent Observation By Indians —And Exaggeration By the Press.

ALEXANDER GRAY.

Colonel Currie M.P. has a new iron ore area about twenty five miles north of Sprague, east of the Soo. It may not be as big as what they have in the northern tier of states over the border—notwithstanding exaggerated reports appearing in the daily press—but it is of sufficient importance to warrant drilling operations and has romantic antecedents to entitle Indians as keen observers to further credit marks as prospectors.

The Indian located the St. Eugene. The same is true of the Helen Mine. About sixty four years have elapsed since Herrick in running his lines with white assistants and Indian guides spotted the Helen—and it was about that time more "float" containing iron was noted. The Indians knew of it. Herrick's notes had references to it, as well as to the Helen indications. Gates took the Helen, when it was staked for him by the Indians—and Col. Currie declined another area offered to him for $500—a fact which he afterwards regretted.

For years the Colonel cherished a mental note about what he heard as to "float" north of Sprague. Having missed the Helen and the Magpie, he concluded another bunch of hematite ore low in phosporous would not be amiss. It happened, however, that conditions for prospecting were not altogether auspicious. Then the War intervened. Anyhow he waited and watched —and a few months ago he was willing to make the effort. Rather he retained Archibald M. Campbell, a Mining Geologist of Ottawa, to make the effort. Mr. Campbell was fortified with Herrick's 1857 field notes, which stressed the presence north of Sprague of a large quantity of boulders in which there was "excellent hematite iron". Other details as to the exact location were somewhat meagre.

But Mr. Campbell has hit a good many trails—and is familiar enough with the red man's lingo to make his way. So, off he went with his guides. In due course he picked up the essential Herrick lines. Then he worked into what had possibilities as iron country. Eventually he got the "float"—and manifestly it had not travelled far. Whence it came puzzled the geologist. Indian reports and Herrick notes had been veridied. Beyond that Mr. Campbell was left to his wits—and those he exercised by examining the striae—the rock surfaces as marked by glacial action. Mr. Campbell called upon the glacial age to bear witness—and that led him across a lake where, in contact with greenstone on the hanging wall and quartzite on the footwall, the "find" of red hematite was made. Two-

and-a-quarter miles was staked for Col. Currie—and the samples taken are satisfactory.

There is "red iron", disseminated specular hematite, and more of the latter in a micaceous formation. According to Mr. Campbell, the iron is where it ought to be—yet he declines to concur in the newspaper tales about this being the precursor of another Gogebic or Mesaba Range. To the contrary, while hopeful, he declares there is no reason why the locality should be unduly magnified. Picked samples have yielded 68 percent metallic iron. The section between the greenstone and the quartzite is about half a mile in width. There is a possibility, owing to its purity, of much of the iron being recovered by concentration—and it is that feature which is giving those concerned most encouragement.

Mr. Campbell says "the truth is all we want. Fiction is misleading."

ENGLISH ELECTRIC COMPANY OF CANADA, Ltd.

Big developments are taking place in the electrical industry in Canada. The English Electric Company of Canada, Ltd., of which Mr. Gordon F. Perry, of Toronto, is President, and which includes among its directors many prominent financial men and captains of industry, is associated with the English Electric Company, Ltd., of Great Britain, is already established and has a continent-wide sales connection.

The Canadian Company holds the exclusive manufacturing rights in perpetuity for the English Company, having the use of all the latter's patents, designs and processes, etc. In addition, it will secure preferred prices on all imported machinery and equipment, also securing the benefit of the preferential tariff and the present favorable exchange rates. It acts as the ageney for the English Company, which is the largest manufacturer of electrical and allied machinery and equipment in the British Empire, and, through it, all selling, engineering and construction work in Canada is done. It further holds the right to sell its own products in the United States.

Some idea of the scope of the operations of the English Electric Company, Ltd., of Great Britain may be gained from the fact that it maintains eight branches in the United Kingdom and ten abroad. Its activities are world-wide, and it is, naturally, exceptionally well placed to produce and sell the machinery, apparatus and appliances requisite for the adequate development of industries and underlakings, which have been delayed for the past few years. It controls and operates the Dick, Kerr Works at Preston, Eng.; the Ordnance Works at Coventry, Eng.; the Phoenix Works at Bradford, Eng.; the Siemens Works at Stafford, Eng.; and the Willans Works at Rugby, Eng. With the exception of the Ordnance Works at Coventry, all these are well-known as pioneers of the electrical industry in various branches.

By means of its association with the English Electric Company of Great Britain, the Canadian Company will be a progressive force in the electrical manufacturing industry of Canada. The increasing use of electrical machinery in all industries; hydro-electric power developments; the extending and re-equipment of our civic tramways and railways; the electrification of our railways; the equipment of our merchant marine with electrical engines; the increasing use of electric appliances of all kinds in the home; motor accessories; —all these will demand a huge amount of new electrical equipment.

Cooperating actively with the management of the Canadian Company are the Research Department and the heads of the Engineering and Construction Departments of the English Company.

It should be added that the entire undertaking of the Canadian Crocker-Wheeler Company, Ltd., of St. Catharine's, Ont., has been acquired, so that all the valuable patents and designs of this last-mentioned Company are available.

PORT ARTHUR NOTES.

By J. J. O'CONNOR.

An old-time gold location, staked in the '80's is again attracting considerable interest. The property is situated immediately south of Gwynne Mountain, near the shore of Worthington Bay, about two ad one-half miles from Schreiber, on the Canadian Pacific Railway.

This property was located by Mr. Peter McKellar, who did some preliminary development work, that gave great promise of the property developing into a valuable gold producer. Mr. McKellar shipped a car-load of the ore taken out at that time, to the Dominion Reduction Works, at Rat Portage (Kenora) which showed a recovery of $21 per ton on the plates. For some reason the property was allowed to fall into disuse, and nothing has been done in the meantime, until Mr. William Longworth obtained a working option in the Summer of 1920. Since that date active exploration and development has been carried on with highly satisfactory results.

A tunnel has been started on the original vein and is now in 25 feet, showing good gold values throughout. Assays from the tunnel and tests pits on the vein gave results varying from payable ore, up to $1,170 per ton in gold.

A new vein was located on the 20th August, about one hundred feet to the eastward of the original vein. This vein is traceable for over half a mile, varying from three to four feet in width, and paralleling the original vein for its entire length. Samples taken from the surface at various points where uncovered, show free gold in good quantity, indicating that the values are continuous. The country rock between the veins is an altered porphyry, carrying small values in gold.

The vein matter in the second vein is a sugary quartz, carrying tellurides and free gold in shot form. Mr. Longworth is now engaged in removing the overburden from the new vein, at points about one hundred feet apart.

This property is in the immediate vicinity of the property, R606, operated some years ago by the Morley Brothers, of Detroit, Mich., from which they shipped a sample cargo of pyrites.

The success that has attended the McKellar, has caused a number of locations to be staked in that vicinity since the opening of this season.

The International Nickle Company announced on the 24th. instant that a reduction of 100 men would go into effect at an early date. A cut down went into effect some time ago, reducing the number of employees to 600. Two hundred men will be retained. The official announcement states that the reduction is being made owing to business depression, and the large stocks on hand, and that they hope to resume at a reasonably early date. Their Port Colbourne refinery will close down, and the Bayonne, N.J. refinery will close down for a period of four months.

TEMPERATURE AND MOISTURE IN DEEP MINES.

Factors of Control.

In the third report of the Committee on the Control of Atmospheric Conditions in hot and deep mines, presented before the Institution of Mining Engineers, Mr. J. P. Rees gave the results of observations made at five pits, selected on account partly of the depth of the workings and partly of the specially adverse conditions which make temperature control difficult.

The collieries in question were Pendleton, near Manchester; Pendlebury, Lancashire; Shelton Deep Pit, North Staffordshire; Bowhill, Fifeshire; and Bentley, Doncaster. The object of the work, which was organized from the Doncaster Coal Owners' Laboratory, was to investigate in detail the operation of causes leading to the existence of high underground temperatures, and particularly high wet-bulb temperatures. In the report the determining factors are analysed and distinguished as far as practicable, and the result are displayed by means of charts.

There are three causes for the rise of temperature in underground workings. The first is the heating due to the compression of the air as it descends shafts or inclines (about 5½ deg. F. per 1,000ft. of descent); the second is conduction of heat from surrounding strata; and the third is formation of heat through oxidation of coal or other minerals and timber. The increase in the moisture contained in the air is due to evaporation of the water that percolates through the walls of shafts and roads or is present in freshly exposed coal or other material. The heat and moisture given off from men, horses, and lamps is scarcely appreciable in a coalmine.

Heating by compression cannot be obviated except at the expense of evaporation; but it can be, and to a large extent always is, averaged over the year in the actual workings of a mine, the walls of the shaft and roads giving off more or less heat to the air according as the external temperature is lower or higher. In exceptionally warm weather the walls may even take up heat from the air.

Heating by conduction from the surrounding strata is reduced to a minimum in shafts and roads when the volume of air passing is sufficiently large, because the flow of heat through the zone of cooled rock which in course of time comes to be formed round a shaft or airway is comparatively slow. If the air-flow is large, the flow of heat from the strata is not sufficient to warm the air more than very slightly, but if the air is flowing very slowly the heat-flow is sufficient to warm it to practically the temperature of the strata. The practical importance of a large flow of air in controlling underground temperatures is thus clear.

In this country the rate of increase of the natural rock temperature with depth is always much greater than the increase of air-temperature from compression. At the collieries referred to in the report the rate of increase in rock temperature is 1deg. F. for about every 60ft. or 70ft., whereas the air-temperature increase from compression is only 1deg. in 182ft. In the Witwatersrand district, however, the rock-temperature increase is only 1deg. in 250ft., so that if a deep mine were dry abundant ventilation would warm it, in contrast to the cooling effect in this country.

Heating by oxidation, which is referred to only incidentally in the report, can evidently also be controlled by abundant ventilaion.

Increase in the moisture-content of the air can usually be controlled as effectively by ventilation, until the actual working face is reached, as can increase in temperature. This is shown by all the charts except one for Bowhill Colliery, which has very wet shafts and roads. But with abundant ventilation the cooling effect of evaporation from wet roads would evidently keep the temperature along these roads low, and thus indirectly control the amount of moisture in the air and the wet-bulb temperature. The very rapid rise in moisture-content of the air as it passes along a working face over fresh and relatively moist coal is shown in all the charts.

PERSONAL.

F. W. Gray, who previously to taking the editorship of the "Journal" was for fifteen years in the service of the several companies now forming British Empire Steel Corporation has joined the headquarters staff at Montreal and his address is 708 Transportation Building.

J. Shanks, Manager of the Brazeau Collieries at Nordegg, Alberta, has recently passed through Montreal on his way to his home in Scotland, where he is to spend a holiday. Mr. Shanks is one of the best-known and most efficient colliery executives in Alberta, and has taken a leading part in adapting electrical haulage to coal-mine conditions.

Mr. O. N. Brown, of the Nova Scotia Steel & Coal Company's staff at New Glasgow, has been removed to headquarters of B. E. Steel Corporation in Montreal. Mr. Brown is a member of the C. I. M. & M. and a graduate of McGill in mining engineering.

Mr. T. O. Bosworth, who played an important part in the exploration of the Mackenzie River oilfield has arrived at New York and is expected to visit the Western Canada oil districts after a trip to Oklahama.

Mr. F. C. Sutherland has returned to Toronto from England.

Mr. Iichiro Omori of the Kumamoto Technical College, Japan, is in Toronto. He is touring Canada and the United States, studying methods of metal production and metal working. He has been recently in Pittsburgh visiting steel plants there. From Toronto he will go to Montreal and New York and then to England and France. In America he has been chiefly impressed by the improved mechanical apparatus for the handling of material.

Sir Archibald Mitchelson, Mr. J. Stanley Holmes, Mr. John Hambley and Mr. G. Whitehead of London have arrived in Toronto on their way to the Northern Ontario gold and silver districts. They are particularly interested in the Davidson gold mine. Accompanied by Mr. H. H. Sutherland, they will spend two weeks in the North, including a few days at Temagami. Sir Archibald Mitchelson is a director of nine important colliery companies situated in Wales and Yorkshire, and is chairman of a number of these companies.

B.C. PLANT TO EXTRACT NITRATES FROM ATMOSPHERE.

The Rossland "Miner" states that the Waneta Power Company is erecting a plant for the extraction of nitrogen from the air and its fixation. The site is at the mouth of the Salmon River, near the U.S. border, and although the newspaper account does not give exact figures, it is understood the undertaking is on a large scale.

Northern Ontario Letter

THE SILVER MINES.

The Cobalt Field.

During the closing week of August, the price of silver reached a point well above the average for any one month since January last. At the time of writing, the metal is quoted at 38⅜d. in London and 61½ cents an ounce in New York. This means that the producers in the Cobalt field are receiving at the rate of between 69 and 70 cents an ounce in Canadian currency.

A strong demand for silver in the Far East, and official statistics which show Mexico to have produced less silver during the first half of 1921 than was the case in the first half of 1920 have served to emphasize the very great scarcity of the metal. Another factor contributing to the influences at work in sending the price upwards is very serious discussion in leading British papers about the advisability of the re-establishment of bimetallism by international agreement as a means of offsetting the shortage of gold behind the paper issues of some of the leading nations.

Upwards of 700 tons of material is being treated daily in the plants on the Coniagas Mines. Of this total some 375 tons daily is coming from underground while the balance is made up of sand and slime tailings from past operations. The company has a total of only 105 men on its pay-roll and the tonnage per man engaged is much greater than at any other precious metal mine in Canada. In mine rock alone, the force engaged in this branch amounts to between four and five tons of ore daily per man, while, including the sand and slimes, the entire force is handling an aggregate of close to seven tons daily for each man on the pay-roll. This record is actually more than double the average at the silver and gold mines of Northern Ontario, it being considered generally quite satisfactory to handle an average of two tons of ore per man daily. This high tonnage rate at the Coniagas reflects an exceedingly high degree of efficiency and is being pointed to as the secret of the company in being able to operate profitably on material which contains less than an average of 10 ounces of silver per ton, valued at from $4 to $6 a ton.

Samuel Cohen of the Crown Reserve Mining Company as well as of the Porcupine Crown Mines of Porcupine is at present engaged in making an examination of property in Northern Manitoba. Among other properties, Mr. Cohen has been looking over that of the Murray Brothers, situated at Elbow Lake and upon which such spectacular discoveries were made a few weeks ago. The result of the assays obtained as a consequence of Mr. Cohen's sampling will determine the question of whether a venture will be entered into in Northern Manitoba, or not.

The special representative of the Canadian Mining Journal for Northern Ontario will spend the first week of September in certain of the mining districts of Northern Manitoba with a view to comparing the outlook in that promising new field with the situation in Northern Ontario. "Journal" readers will be given an opportunity to read the information thus gathered.

Major J. McIntosh Bell, of the Keeley Silver Mines, has returned to the property after spending the past several weeks in the northwest, particularly in the vicinity of Great Slave Lake. Major Bell is deeply impressed with the magnitude of the oil and mineral possibilities of the vast undeveloped territory of the Canadian north-west.

Captain H. Hibbard, of Kent, England, visited the Cobalt district during the past week in the interests of British capital. Among other properties visited were the Dickson Creek mine, about two miles north from Haileybury, as well as the La Santa Lucia and Cartwright Goldfields at Painkiller Lake. Capt. Hibbard is sailing for England this week, and expressed the belief that a great amount of money in England is likely to seek employment in Canada.

Elk Lake and Gowganda.

Although an announcement was made officially some time ago that arrangements had been made for the sale of bonds as a means of financing the construction of a light arrow-gauge railway from Swastika to Gowganda by way of Fort Matachewan and from Swastika to Larder Lake by way of Kirkland Lake, nothing further has been issued in the way of official information relative to construction. As a result of this, various property holders in the districts in question are biding their time, with a view to learning what the method of transportation is to be.

Although negotiations have been under way for some time, nothing definite appears to have been arranged in connection with resuming work on the property of the Cane Silver Mines. The question of the ability of those in control to raise the money required to work the property will probably be determined within the next month or so.

The Silver Triangle and the Ontario Solid Silver Mines, both properties being in the Auld and Cane township section of the Montreal River district are also still lying in idleness. The latter is in strong hands and may be re-opened at such time as the owners decide, while the Triangle is endeavoring now to raise $100,000 with which to get work under way.

THE GOLD MINES.

The Porcupine Field.

Activity in the gold-bearing territory lying round about the Porcupine and Kirkland Lake districts is increasing week by week. In all directions where a few months there were only signs of possible work, there are now numerous operations actually under way.

Reports of new discoveries carry tidings of the reward which is falling to the lot of the pioneers, and with this great spread in prospecting activity it would be a pessimist indeed who would say that a great many more gold-producing mines will not be the final result.

On the Daly claims in the township of Bristol about a dozen miles south-west of the producing section of the Porcupine field an important discovery is said to have been made. Late reports would indicate that in a wide quartz vein the gold content has been found to average about $8 per ton. A feature of the occurrence is that the quartz as well as the geological structure is quite similar to that found in the Hollinger area.

An analysis of the work on the Hollinger Consolidated as based upon official figures up to the end of July, and working at full capacity up to the end of December places the probable income of this company at close to $11,000,000 for the whole of the year 1921. It is estimated that net profits will easily reach $375,000 every four weeks from this date forward or at the rate of over 19 per cent annually on the company's issued capital. This outlook has given rise to the belief that in addition to the regular dividend disbursements of 1 per cent every four weeks, or 13 per cent a

year the company will be able to pay a bonus or a capital reduction of 5 per cent annually.

Interests closely identified with the Dome Mines Company express the belief that the company will not depart from its present dividend rate of 2½ per cent. quarterly, but will continue to make these disbursements, and will at the same time add to surplus at as rapid a rate as full capacity operations will permit. In this manner the indications are that the treasury will be sufficiently strong to commence making capital returns by the end of the company's current fiscal year which will end March 31st. It is believed the company will be able to pay 20 per cent capital reduction annually, plus the 10 per cent in dividends, thus returning a total of 30 per cent a year.

One of the leading mining concerns in the United States has expressed a desire to get behind the Porcupine V. N. T. Mines to the extent of purchasing the 475,000 shares in the treasury and to even go still further toward placing the enterprise on a producing basis on the largest possible scale. On the other hand, the English interests in control of the company have recently evinced an intention to do the financing themselves. In any event, the Porcupine V. N. T. appears to be in line for interesting and important developments.

Arrangements have been made in connection with the financing of the Davidson Consolidated. The company is now to be known as the Porcupine-Davidson, and the preliminary work in connection with de-watering and re-opening the mine are already under way. The former company was capitalized at $5,000,000, this being made up of 5,000,000 shares of the par value of $1 each. The capitalization of the new company will be approximately the same, being 1,000,000 pounds sterling. A sum of 200,000 pounds is to be set aside as working capital, of which 50,000 pounds is already guaranteed, and another 100,000 pounds underwritten.

The La Palm Porcupine interests have notified the Allied Porcupine Company to vacate the La Palm property on the charge of alleged failure to live up to the terms embodied in the merger agreement. The La Palm has refused to transfer its assets and the Allied Porcupine is taking legal action to enforce the delivery.

The Kirkland Lake District.

According to the regular monthly statement of the Lake Shore Mines, this company produced $49,155.26 during July. A total of 1,967 tons of ore went through the mill, this being at the rate of over 63 tons daily, the highest average so far in the history of the mine. The mill ran 92.60 per cent. of the possible running time. Hydro-electric power was off 27 times and resulted in a loss of 4.1 per cent of the possible running time. Work was carried on at eleven different points, seven of which were at the 600-ft. and four at the 400-ft. level. A total of 149 feet of work was done at the 400-ft. level and with 179 feet done at the 600-ft. level. A feature of the report is that in addition to the large daily tonnage treated, the "surface suspense stock" was increased by 321 tons of ore.

Considering spectacular ore has been opened up at the lower levels of the property of the Kirkland Lake Mining Co. The work of placing the mine in condition to produce ore in sufficient volume to operate the mill at full blast has been carried out and the handicaps caused by last year's labor shortage and a heavy cave of rock underground have been pretty well overcome, and the company is now in a position to reap the profits of a long period of stored up effort.

Foundations are in and the structure to house the milling plant o the Ontario Kirkland will be in course of erection within the next few days. The mine is being equipped with a 100 ton mill and is developed sufficiently to assure full tonnage of good grade ore. The Ontario-Kirkland offers promise of taking its place among the profitable producing gold mines of this country during 1922.

Another vein carrying commercial values over a width of close to two feet has been found at outcrop on the King-Kirkland. The vein is less than 100 feet from No. 5 on which a shaft was driven to a depth of 100 feet and on which considerable ore was opened up.

The erection of camps on the Queen Lebel is under way, and an aggressive scheme of exploration and development work has been arranged for.

A limited amount of work is being done on the Costello property, on the east shore of Goodfish Lake in the northern part of the Kirkland Lake district.

Sandy McIntyre, discoverer of the Temiskaming Mines at Cobalt, the McIntyre-Porcupine Mines at Porcupine and the Teck-Hughes Gold Mines in the Kirkland Lake district, has made another discovery of gold in the township of Gauthier a short distance east of the Kirkland Lake field itself.

Encouragement is reported to have been met with as a result of surface exploration by the Crown Reserve Mining Company on property in the Larder Lake district. Assays are reported to average about $4 per ton across a width of 40 feet. The gold content is therefore considered a little too low to make the body of commercial grade under the prevailing conditions in that field, but further explorations will be conducted with a view toward finding out whether higher values may be opened up at depth or at other points along the vein or dyke. The gold occurs in altered basalt.

British Columbia Letter

Stewart and Alice Arm: A first shipment of 20 tons of high-grade ore has been shipped by the Fish Creek Mining Co., whose property is situated on Fish Creek, Portland Canal District. As soon as the road which the Alaskan Administration is building up the Creek is completed it is the intention to instal a compressor. Extensive alterations to the dock at Stewart are being made preparatory to the construction of ore bunkers by the Premier Mining Company. Encouraging reports come from Marmot River where the Patricia Group is being developed together with the Washington, Prince George and other properties. Work on the former is to be continued throughout the winter.—A new strike is reported on the Dolly Varden, Alice Arm. The lead was uncovered on the surface about 20 feet above the old workings and picked samples are said to have assayed 267 oz. in silver.—A. H. Lawry of San Francisco, Cal., recently visited and inspected the Dolly Varden.

New Hazelton, B. C. — The John Gariel Silver Property, Copper River, is being opened up with satisfactory results. A trail is being constructed to the property, finances being furnished jointly by the provincial government and the owner. With transportation facilities, and the ready obtaining of plant and supplies assured, development will be expedited.

Rossland, B. C.—The new concentrator of the Le Roi No. 2 is in operation. The ore on the dumps is to be treated first after which attention will be given to the mining of the property.

Trail, B. C.—The Trail Mining Co.'s property, near Salmo, the ore of which is an oxidized lead containing silver values, has been developed recently by the driving of a 600 foot tunnel. The main lead is 16 feet wide. On the construction of a road it will be possible to commence shipping.

One quarter of a million tons of ore and concentrates were received at the Trail smelter this year up to and including August 7th last. Of the actual total 250,980 tons, 246,140 tons were from the properties of the Consolidated Mining & Smelting Co. and 4,840 tons were custom ore. Ten properties shipped ore to the smelter from August 1st to 7th. There were included the Freddy Lee and the Majestic of Sandon, the Kokomo of Beverdell, the Skyline of Ainsworth, and the Bingo.

Sloean, B.C.—It is likely that the Lucky Jim Mine Company will be re-organized and early steps taken to open up the property. The new company proposes to start development by continuing the 400-foot level beyond the worked-out section and well into the hill. A raise at the point in mind will give 1,000 feet depth and will prove or otherwise the continuance at depth of the ore bodies which outcrop. If these ore bodies are similar to those worked the values will be predominatingly zinc at depth with higher values in lead and silver towards the surface.

Robert Strachan, senior mines inspector of the Province of British Columbia, has been appointed to represent the Province at the International Conference to be held on the 1st and 2nd of September at St. Louis, Mo., to consider the question of standardization of methods of training men in the use of breathing apparatus. Owing to illness Hon. Wm. Sloan, Minister of Mines, will be unable to attend. He has prepared a paper which will be read by Mr. Strachan.

The first aid team of Nanaimo, B.C., holders of the Montizambert Cup representing the Canadian championship, will compete in the international meet arranged to take place at St. Louis at the same time.

The Annual First-Aid and Mine-Rescue Meet of the Vancouver Island Mine Rescue Association will be held at Cumberland, B.C. on Labor Day, September 5th. Entries have been received from all the collieries of the Island and keen interest is being manifested in the events throughout the coal mining centres of the Coast.

DRILLING FOR COPPER AT LITTLE BAY, NEWFOUNDLAND.

S. J. Fitzgerald, president of the Sudbury Diamond Drill Co., and Jack Peer, have passed through North Sydney en route to Newfoundland. The former has two diamond drills in operation at the copper areas of W. A. Mackay at Little Bay, Nfld., which are doing excellent work. Bores holes have been sunk to a distance of over 1,600 feet within the past few weeks, but the results, if any, have not been given out. Drilling operations will be continued all winter, Mr. Fitzgerald states, in order to prove the quality of the ore.

THE BIRD RIVER COPPER-NICKEL DEPOSITS.

(Reprinted from C. M. & M. I. July Bulletin.)

DURING the fall of 1920 and the late winter, the Devlin Mining and Developing Company has been carrying on active operations on a group of nineteen claims. These claims are situated in the Winnipeg mining district, on the Bird river, some eighty-five miles from Winnipeg and thirty miles from Lac du Bonnet, or thirty-six miles by the canal route. There is a daily train service to Lac du Bonnet, whence motor boat is available to Bird Falls, from which point canoes are taken for the remainder of the journey. Five portages must be crossed, the longest a mile and a quarter in length. The winter road is practically the same as the summer road. The canoe journey is a pleasant and beautiful one, the scenery varied by picturesque homesteads on the lower part of the Bird river, and by several spectacular waterfalls.

The main work has been done on the Devlin and Chance claims. A series of test pits of varying depths up to eighteen feet were sunk to get below the oxidation zone, and to determine the nature and extent of the unweathered minerals. This oxidation zone averages about seven feet, due to the ease with which pyrrhotite weathers. The test pits were sunk at varying intervals along the main mineralized zone. This belt is in the noritic rocks which cut the granite a short distance to the north in a series of fingering branches. The contact is generally sharply defined with a slight absorption of the granite by the noritic rocks. The principal economic mineralization is chalcopyrite and pyrrhotite, with copper and nickel values as high as 9 per cent for the combined metals.

Petrography. (a) The noritic types. This intrusive is named provisionally, there being three distinct types and some intermediate forms. Microscopic examination would be necessary to determine whether these are distinct types or phases of the same. The variation often occurs, within short distances, from a very coarse hornblendic rock, like a lamprophyre, to a very fine grained black rock. The third phase is a porphyritic type, with hornblende crystals embedded in a matrix of the finer grained material. On the contact there are minor amounts of rather fine to medium grained material which is similar to the Muskwa river norite. Other phases with a finer grain, have dark parallel lenticular inclusions, about a quarter of an inch long, possibly absorption granite products. The westerly pits on the Chance claim are the best developed.

(b) The granite: The granite to the north is light pink to white in colour. The hand specimen shows biotite, muscovite, clear glassy quartz, and much crushed fel spar. There has been, apparently, a great deal of mechanical crushing during the intrusion of the norite.

(c) Quartzite: There are also inclusions of a fine grained quartz rock with clear glassy quartz blebs one-eighth of an inch across. This rock resembles a typical quartz porphyry, but further examination over a wide range leads to the conclusion that the quartz blebs are secondary, and that the rock is a quartzite member of the Wanipigon series, of which the clayey members gave way to form sericitic and garnet schists.

Description of pits sunk. (These are numbered, for the purpose of this article, from west to east.)

No. 1 is about twenty feet deep, in fine grained dark noritic rock. A twelve-inch quartz vein carrying chalcopyrite crosses the pit at forty-five degrees, and, below the footwall, veins of chalcopyrite cross the shaft. Four veins merge into a two-foot vein at the bottom of the pit.

No. 2 lies 165 feet north and is twenty feet deep, in the same type of norite showing many slickenside slip

faces or shearings. Quartz carrying some free gold, pyrrhotite, magnetite, and chalcopyrite, is found nearby.

The magnetite band, two to three feet wide, runs one hundred and fifty feet north and is opened by pit No. 3 on the Devlin claim, where it is seen to contain minor amounts of chalcopyrite. The granite contact is close to the north. For over a claim length east the country is clay covered, and then there are eight more pits, varying in depth from three to eighteen feet, along the contact. These extend from one side of the Chance claim to the other. They all contain pyrrhotite, with minor amounts of chalcopyrite; the typical black oxidation product of pyrrhotite, purple weathering pyrrhotite, nickel-bloom, and limonite are the common weathering products. The norites are mainly of the porphyritic and coarse types previously described.

To sum up, this is a prospect, favourably mineralized over a long contact zone. The geographical position is extremely favourable, it being possible to reach the property in twenty-four hours from Winnipeg, winter or summer. The proximity of the Point du Bois hydro-electric plant of the City of Winnipeg, less than fifteen miles south, solves the power problem, and there is plenty of firewood and some spruce timber in the vicinity. With these facts in mind, the directors' decision to carry on active stripping operations during the summer, with a view to the future developing of the ore-body by diamond drill, seems to be highly justified.—L. G. T.

BOOK REVIEW.

RECENT PRACTICE IN THE USE OF SELF CONTAINED BREATHING APPARATUS. Lt. Rex. C. Smart, M.C., R.E. 7½ by 5 inches, 243 pp. with Index. Cloth. J. B. Lippincott Company, Philadelphia, U.S.A., and Chas. Griffin & Co. London. 1921.

Lt. Smart's record of the use of oxygen breathing apparatus in trench mining operations during the war is remarkable for its military style and reticence. Reading between the lines, the civilian acquainted in any way with the use of oxygen breathing-apparatus in mine-rescue work, can detect a wealth of human endurance and courage, and some instances of astonishing self-sacrifice. Take the following example, which is quoted as written: "Six men were in the mine at 7 a.m. when 'blow' occurred; in addition, two lives were lost, due to attempts at rescue being made by persons who were not wearing rescue apparatus, but who went into the mine with a life-line attached to them. They were overcome by gas, and when attempting to drag them to safety their bodies jammed in the small gallery, so that it was impossible to move them." For a man who is a certified colliery manager, Lt. Smart's description is an indication of how thoroughly our citizen armies must have become permeated by military discipline, and what real veterans there were in our fighting lines among the civilians turned soldier.

The book is intensely interesting, and the foreword by Sir John Cadman is not at all too appreciative of its importance when he describes it as a "description of the most rigorous and lengthy test to which self-contained breathing apparatus has ever been put," and Sir John Cadman brings out a most important point when he remarks further "The carefully correlated detail of Mr. Smart's book in itself is an example and pattern of the practice that should be emulated by all those who supervise and control rescue operations and have the care of self-contained breathing apparatus under their charge."

The most convincing account of the possibilities of oxygen breathing-apparatus given by Lt. Smart concerns the charging and tamping of a mine containing 6,000 pounds of ammonal by men wearing Proto apparatus in a gassy gallery by seventeen trained men of a company of the Royal Engineers. The atmosphere of the gallery which in part was only 3¼ ft. by 2½ ft., contained 1.65 percent of monoxide, 4.3 percent of dioxide, 1.42 per cent of hydrogen and methane and only 16.77 of oxygen. Gas was entering the gallery continuously from an enemy mine fired two weeks previously. The ammonal was handled in double sandbags containing 20 pounds each. Forty-three hours was consumed in the work, the two shifts relieving each other every two hours. Actually each man did about 10 hours work underground in the 43 hours. In addition to the laying of 6,000 pounds of ammonal at the extreme end of the gallery, some 65 feet of solid tamping, with alternate air-spaces, was done. When one sums up the combined effect of the heavy labour accomplished, the confined space; the nervous strain on the workers, as "enemy activity necessitated a heavy 'blow' as soon as possible"; the unremitting nature of the labour, and the conditions of weight and discomfort under which the very best of breathing apparatus must be worn, the accomplishment is one to be brought over and studied by those who have to do with mine-rescue work in peace-time industrial operations.

Lt. Smart's book deals entirely with experiences with the "Proto" apparatus and the lighter apparatus of the Siebe Gorman Co. known as the "Salvus". The last-named apparatus does not meet with commendation, owing to its limited capacity, and the standard two-hour type of "Proto" apparatus is given preference under all mine conditions.

The greatest value of the book consists in the details of failures of pressure, due to worn valves, rust-clogging, and other defects of mechanism that experience has shown to be likely to develop. The information given on this point is very detained. Similarly full and detailed is the list of physical reasons and personal idiosyncrasies which debar men from suitability for training in the use of breathing apparatus. Some men are too big, and demand too much oxygen for their bodily needs; others develop an unexpected oxygen-deficiency syncope, others are too weak or have cardiac defects or lung trouble. The best type of wearer is a man weighing between 140 to 170 lbs., aged 20 to 37 years, 5 ft. 4 inches to 5 ft. 10 inches in height, always provided the mental capacity and health of the person is suitable.

The book is illustrated by seven folding maps to illustrate the tunneling experiences referred to in the text.

Condensation has been so generally carried out and the details given are so statistical and exact, that thorough review would required wholesale quotation, and the book is therefore recommended as one to be bought and studied by those interested in knowing precisely what oxygen breathing can accomplish, and what the apparatus will stand, under very rigorous conditions so closely allied to ordinary industrial mining conditions, that useful and practical analogies can be drawn. —F. W. G.

TORONTO MINING QUOTATIONS.

Quotations on Active Stock on Standard Stock Exchange on August 29th, 1921.

Silver.	Ask.	Bid.
Adanac Silver Mines, Ltd	2	1½
Bailey	2½	1½
Coniagas	1.60	...
Crown Reserve	10	8½
Foster	..	1½
Gifford	..	½
LaRose	24	23½
Peterson Lake	5	4½
Mining Corp. of Can.	1.12	1.05
Temiskaming	....	2
Trethewey	14	...
Gold.		
Atlas	20	15
Dome Lake	8	6
Hollinger Cons.	7.30	7.25
Keora	8	7
Kirkland Lake	....	39
Lake Shore M. Ltd	1.27	1.25
McIntyre	2.04	2.03
Moneta	....	11
Porcupine Crown	16	15
Porcupine V.N.T.	20	16¼
Preston East Dome	2¾	2
Schumacher	23	22
Teck-Hughes	16¾	16¼
Thompson Krist	5	4
West Dome	8½	8
Oils.		
Petrol Oil	25	23
Rockwood Oil, Gas	....	½
Vacuum G.	4¾	4½

METAL QUOTATIONS.

Following are the fair average prices for ingot metals (in less than car-loads):

	Cents per lb.	
Montreal.	Aug. 24th.	Aug. 31.
Copper, electric	17	17
Copper, casting	16¾	16¾
Tin	32½	33½
Lead	6¼	6¼
Zinc	7	7
Aluminum	29	28
Antimony	7	7
Toronto.		
Copper, electric	17	17
Copper, casting	16¾	16¾
Tin	35	35
Lead	6¾	6¾
Zinc	7½	7½
Aluminum	27	27
Antimony	9	9

ANTHRACOAL.

Anthracoal is a new domestic and metallurgical fuel which appears to have excellent qualities. It is a mixture of small particles of anthracite coal and a matrix of practically pure carbon, formed from the distillation of coal-tar pitch or other suitable bitumen. Some account of tests made on it is given in a paper to be presented by Donald Markle at The Wilkes-Barre meeting of the American Institute of Mining and Metallurgical Institute, Sept 1921.

TORONTO COAL PRICES.

Toronto, 31st August.—An improvement in the lump coal situation, so far as bituminous is concerned, is still noticeable. It is not so much that the actual orders are coming along more freely—although, to a certain extent, this is so—as that the enquiries are far more numerous than was the case a few weeks ago. As soon as the Exhibition is over, it is expected that orders will very appreciably increase in volume. The price of lump remains unaltered. That of slack is from around $1.65 to $2.00 a ton. In Toronto, the citizens seem to be getting in their supplies of anthracite, although belatedly, in a satisfactory way. But the same thing cannot, yet be said of certain outside points where people are reported to be still holding off from buying.

NOTES FROM NOVA SCOTIA COLLIERIES.

The output of the Acadia Coal Company in July was 29,302 tons, the mines having worked only partial time because of the lack of outlet. The Albion, Allan andNo. 3 mines only were in operation during July. For the seven monthes ending July the production totalled 227,262 tons, and it is unlikely that outputs during the remainder of the year will exeeed the average monthly production so far reeorded.

The production of the Nova Scotia Steel Company's eollieries during July was 56,257 tons, from four collieries, whieh included 7,034 tons from the new Colliery No. 7. Output for the aggregate seven months of 1921 was 337,082 tons, and this rate of production is also unlikely to be exeeeded during the closing months of the year.

The sub-lessees of the Port Hood & Richmond Coal & Railway Company's properties at Port Hood have for some months been working an area of rise coal above high-water mark, but during the recent period of slack demand for coal, and since the unfortunate imposition of the export embargo of 1920 on coal from eastern coal mines in Canada, the financial returns have been insufficient to make operations profitable, and as the result of an accumulation of unpaid wages, the miners' union invoked the aid of statutory provisions by placing a miners' lien on the property in order to secure their unpaid wages against other creditors. The status of coal-mining in Port Hood has been very indefinite since the flooding of the mine in 1909, and, as the original owners of the property lost all they had invested in it, their interest has naturally been of the slightest, and no attempt has been made to find out whether the mine is irremediably flooded or not. The parties who have been working the Port Hood areas showed commendable enterprise, and were able to carry on profitably so long as prices for coal remained high, and demand was good, but they cannot continue to mine coal under present conditions of wages and hours of labour and in face of depressed mining conditions without much greater capital reserves than they possess. There can be no permaneney in coal mining in Nova Scotia except through large consolidations of coal areas backed by financial reserves large enough to carry the operators over the dull markets that periodically recur in the coal-trade, and to recover from the accidents and disasters that are apparently inseparable from coal mining.

PROTEST AT FORCED SALE OF WACHMAN MINING & MILLING CO.

Under date of 24th August, a letter has been sent to the shareholders of the Wachman Mining & Milling Co., Ltd., signed by a Committee consisting of Mrs. A. Inec. H. R. Greenwood, Albert Fickler, L. G. Seeber, John G. Coogan, Joseph Stephens, Victor Dehn and Emil Steelheimer, Chairman of 5918 Augusta Ave., Chicago, complaining of action taken by several of the Company's creditors in forcing collection of their accounts through sheriff's sale of the Company's chattels. Appeal is made to the creditors for extension of time of payment, as the committee believe if such extension is given the Company can pay its debts. It is asking for opportunity to raise the necessary money and the Committee believe the shareholders will help immediately. The Committee state that a large number of people of moderate means are shareholders in the Company, and that if time is given by the creditors it will be possible to save their investment and also to pay the debts in full.

CANADIAN MARBLE CO., BANCROFT, ONT.

It is reported that the Canadian Marble Co., Ltd. plans to develop in a larger way the property at Bancroft. The plans include development of water power and construction of a modern mill. It is proposed to install quarrying equipment which will be driven electrically. Mr. W. H. Matthews of Toronto is manager of the company. The officers are J. J. Ashworth, Melville P. White, Frank McMann, J. M. Robertson, D. A. Campbell, Wm. A. Buck and W. H. Matthews.

Much of the marble used in Canada is imported. As there are large quantities of ornamental stone of good quality in Hastings county it should be possible for domestic producers to supply the market. Dr. W. A. Parks who examined the ornamental building stones of Canada for the Mines Department a few years ago reported very favorably on the marbles in Hastings county.

RECENT GEOLOGICAL REPORTS ON MANITOBA.

Part C of the Summary Report of the Geological Survey for 1920 contains three reports by Dr. F. J. Alcock on his investigations into outlying areas of Northern Manitoba, namely, Ospwagan Lake-Burntwood River Area, the Rat River route from Threepoint Lake to Southern Indian Lake, and the Terminal Moraine of the Seal-Churchhill Divide. Dr. Alcock gives some interesting historical information of these largely unpopulated districts and details the geology of the observed localities. The economic geology of these districts is not important and is rendered obscure by the overburden of drift and clays and unsorted gravel and sand deposits of glacial origin.

W. S. McCann reports on the interesting occurrence of copper-nickel deposits near the headwaters of Maskwa (Bear) River in southeastern Manitoba, of which an account was published in the Bulletin of the Canadian Mining Institute by Dr. R. J. Colony and reprinted in this journal.

See issue 26th Nov. 1920, page 967, "A Norite of Sudbury Type in Manitoba. Dr. R. J. Colony.

DEVELOPING LEAD DEPOSIT NEAR CRERAR, N. ONT.

While men were engaged in prospecting for gold on properties north of Crerar, a deposit of galena was found. This is now being developed by the Gold Nugget Mining and Development Co. Mr. Ewen McMillan of Haileybury is at the property in charge of work. Mr. E. J. Townsend of Sudbury is president of the company and Clarks F. Charsley, secretary. C. H. Johns of North Cobalt is a director.

The galena is said to carry good silver values and attention is being devoted to this deposit at present. The properties are in the neighborhood of Koo-ga-gaming late and about four miles from the C. N. R.

FLAME QUENCHING DEVICE FOR BLASTING.

A device for quenching escaping flame from a shot-hole and for minimising the danger of blowouts is the subject of a German patent. The tamping of the explosive is a long cartridge filled with some innocuous tamping material, which is not rammed. At the end of the hole and projecting from it there is fastened a rectangular bag or bundle containing similar material which is a continuation of the long cartridge. The materal in the cartridge being easily disturbed is stated to take up the pressure to such an extent that the protruding and connected "bundle" is in most instances not disturbed. Should the hole develop a blow-out, however, it is claimed that the dust-cloud set up by the "bundle" will so cool and lower the heat of the escaping blast as to render ignition of the gas and dust improbable.

DUST SPRAYING DEVICE FOR COAL MINES.

A German device for hand-spraying of dust has been used at the Zeche Constantin der Grosse at Bochum, Westphalia. It consists of a hopper-shaped bucket which is filled with stone-dust and carried over the shoulders of a workman. A trailing connection to a compressed-air pipe is inserted at the bottom of the bucket, which is equipped with a long spout capable of being pointed in the required direction. An injector sucks the dust out of the bucket and sprays it with much force, and it is possible by this device to efficiently apply a dust coating to roof and sides in any place where a man can walk and where compressed air power is available.

COMPRESSED-AIR MINER'S PICK.

A recent number of a German mining periodical shows an air-operated handpick for miners. The tool is shaped like the ordinary handpick, except it has one tine only, and this a very pointed and straight one, the intention apparently being that the point will work its way by percussive action into coal or rock. The device should be very useful in confined spaces where swinging of the pick is difficult or ineffective. The air enters from the end of the wooden handle and passes upwards through the handle to the head of the pick. The instrument has the formidable name of "Pressluftspitzhaeke".

BRITISH COLUMBIA

The Mineral Province of Western Canada

Has produced Minerals valued as follows: Placer Gold, $75,944,203; Lode Gold, $102,753,823; Silver, $53,668,284; Lead, $46,637,221; Copper, $161,513,864; Zinc, $19,896,466; Coal and Coke, $212,573,492; Building Stone, Brick, Cement, etc., $32,168,217; Miscellaneous Minerals, $1,037,408; making its mineral production to the end of 1920 show an

Aggregate Value of $706,192,978

The substantial progress of the Mining Industry of this Province is strikingly exhibited in the following figures, which show the value of production for successive five-year periods : For all years to 1895, inclusive $94,547,241; for five years, 1896-1900, $57,605,967; for five years, 1901-1905, $96,509,968; for five years, 1906-1910, $125,534,474; for five years, 1911-1915, $142,072,603; for the year 1916, $42,290,462; for the year 1917, $37,010,392; for the year 1918, $41,782,474; for the year 1919, $33,296,313; 1920, $35,543,084.

Production During last ten years, $331,995,328

Lode-mining has only been in progress for about twenty-five years, and not 20 per cent. of the Province has been even prospected ; 300,000 square miles of unexplored mineral bearing land are open for prospecting.

The Mining Laws of this Province are more liberal and the fees lower than those of any other Province in the Dominion, or any Colony in the British Empire.

Mineral locations are granted to discoverers for nominal fees.

Absolute Titles are obtained by developing such properties, the security of which is guaranteed by Crown Grants.

Full information, together with Mining Reports and Maps, may be obtained gratis by addressing

THE HON. THE MINISTER OF MINES
VICTORIA. British Columbia

PROVINCE OF QUEBEC

MINES BRANCH

Department of Colonization, Mines and Fisheries

The chief minerals of the Province of Quebec are Asbestos, Chromite, Copper, Iron, Gold, Molybdenite, Phosphate, Mica, Graphite, Ornamental and Building Stone, Clays, etc.

The Mining Law gives absolute security of Title and is very favourable to the Prospector.

MINERS' CERTIFICATES. First of all, obtain a miner's certificate, from the Department in Quebec or from the nearest agent. The price of this certificate is $10.00, and it is valid until the first of January following. This certificate gives the right to prospect on public lands and on private lands, on which the mineral rights belong to the Crown.

The holder of the certificate may stake mining claims to the extent of 200 acres.

WORKING CONDITIONS. During the first six months following the staking of the claim, work on it must be performed to the extent of at least twenty-five days of eight hours.

SIX MONTHS AFTER STAKING. At the expiration of six months from the date of the staking, the prospector, to retain his rights, must take out a mining license.

MINING LICENSE. The mining license may cover 40 to 200 acres in unsurveyed territory. The price of this license is Fifty Cents an acre per year, and a fee of $10.00 on issue. It is valid for one year and is renewable on the same terms, on producing an affidavit that during the year work has been performed to the extent of at least twenty-five days labour on each forty acres.

MINING CONCESSION. Notwithstanding the above, a mining concession may be acquired at any time at the rate of $5 an acre for SUPERIOR METALS, and $3 an acre for INFERIOR MINERALS

The attention of prospectors is specially called to the territory in the North-Western part of the Province of Quebec, north of the height of land, where important mineralized belts are known to exist.

PROVINCIAL LABORATORY. Special arrangements have been made with POLYTECHNIC SCHOOL of LAVAL UNIVERSITY, 228 ST. DENIS STREET, MONTREAL, for the determination, assays and analysis of minerals at very reduced rates for the benefit of miners and prospectors in the Province of Quebec. The well equipped laboratories of this institution and its trained chemists ensure results of undoubted integrity and reliability.

The Bureau of Mines at Quebec will give all the information desired in connection with the mines and mineral resources of the Province, on application addressed to

HONOURABLE J. E. PERRAULT,
MINISTER OF COLONIZATION, MINES AND FISHERIES, QUEBEC.

EDITORIAL

WHY NOT ADVERTIZE THE MINING INDUSTRY?

The Canadian National Exhibition is growing in popularity and usefulness year by year, and, as an educational institution, stands second to none in Canada. Several hundred thousand people visit the exhibition each year and become better acquainted with the industries of this country. The exhibits are such as to make lasting impressions and any person can advantageously spend days in profitable, as well as pleasing, sight-seeing at the Exhibition. Under the circumstances, it is singular that so little attempt is made to give the public a better idea of the part the mining industry plays in the lives of the people of Ontario.

Aside from the little collection of minerals, shown annually by the Department of Mines, there is scarcely an exhibit which advertises the mining industry as such. It is true, of course, that a large part of the materials shown are products of the mines, but nothing is done to impress this on any of the million visitors. Why should we be so secretive about our mineral resources? Agricultural products and machinery naturally take a leading part at the Exhibition, and one new building for showing live stock alone covers eight acres. Yet mine products occupy only a few feet in one building and mining machinery is nowhere. The National Exhibition is not a mere glorified country fair, but a place where the industrial activities of Canada are made evident to large numbers of people. At such a place the mining industry should be creditably represented.

Those who are interested in the mining industry have frequent occasion to complain that the general public is not better acquainted with mining, its methods and its progress, and that Governments do not recognize the good that would accrue from more extensive mining operations. Would it not be well to take advantage of the opportunities that offer to tell the people more about the industry? And among such opportunities the Canadian National Exhibition's position is one of unique pre-eminence.

GOLD PRODUCTION SHOULD BE STIMULATED.

Commenting on the expressed opinion of Sir Archibald Mitchelson, a visiting British banker and broker that the revival of the purchasing power of gold and consideration of international finance make it essential that the production of gold within the Empire shall be stimulated, the "Globe", Toronto, editorially calls attention to the fact that "Ontario's gold mines derive a new importance from their bearing on exchange and the balance of trade. The United States is making it increasingly difficult for other countries to pay their debts to it in goods; hence the value of Ontario's growing gold output as a means of offsetting, in part at least, the excess of our imports from the United States."

It is interesting to note that the gold mining industry of Ontario, is attracting the favorable attention of the Press. This is because the industry is coming more and more to be regarded as an asset to the Province as a whole, as well as a source of profit to those who are directly engaged in it. If the people of the Province can once be made to realize that gold mining may easily be made a very big industry that will flourish when it is most needed as it is now doing in a relatively small way, proper encouragement of the industry will doubtless result. Someday we may have a Government that will be progressive enough to take a really prominent part in the development of the industry.

OIL AND GAS IN WESTERN CANADA.

In a paper prepared for the Edmonton meeting of the Canadian Institute of Mining and Metallurgy, Mr. George Sheppard, states that while too much has been said and too little yet demonstrated concerning the Fort Norman oil field, it should soon be possible to give a fair estimate of the potentialities of this field. By the end of the year four wells will be completed and some definite idea will be obtainable as to whether the Fort Norman field is to be a producer or not. The only well drilled last year was brought in at a depth of 873

ft. and while much remains to be demonstrated, the results obtained at this first well are naturally considered as very satisfactory. Mr. Sheppard, however, believes that there has been too much exaggerated comment.

Of the Czar well Mr. Sheppard says that the results are of no commercial value. This hole was drilled to 3,500 ft. at which depth it was in limestone.

Of the Irma district Mr. Sheppard says that, if the gas pressure can be overcome, there is a reasonable hope that oil may be found at lower horizons. At 1,890 ft. a strong flow of dry gas to the amount of 5,400,000 cu. ft. per day was encountered by the Gratton Creek Oil Co. There were showing of oil at 300, 1,215 and 1,582 ft.

In the once famous Dingman field certain leases have been taken over by the Royalite Oil Co. and there is renewed activity.

While the results obtained in the prairie districts do not encourage excessive optimism in regard to the production of oil, there are undoubted gas fields, practically in unlimited quantity, as has been demonstrated at Viking, Irma and Medicine Hat.

ENGLISH CAPITAL FOR GOLD MINES.

The arrangement made by Davidson Consolidated Gold Mines Ltd, with English interests for financing of operations at the Davidson mine, and the statement by Sir Archibald Mitchelson that English capital is now looking favorably on gold mine operations in Canada, are indications that London has still to be considered as a financial centre which may help in the development of our mineral resources.

There has not in recent years been much to indicate that English money would be a big factor in making mines in Canada. To a very considerable extent, we have been dependent on American interests for money to develop our mines. Close proximity to our mining districts naturally accounts for the fact that the interests of Americans in our mining companies are far greater than that of our mother country. In view however of the fact that English capital has long controlled a large percentage of the gold production of the world, it is surprising that Canadian gold deposits have attracted so little attention in England.

The visit of Sir A. Michaelson's party to Northern Ontario has received considerable attention, not only because of its importance to shareholders of Davidson Consolidated, but because so few Englishmen come out to this country to get first hand information about the industry that is growing up slowly in Northern Ontario. There can be little doubt that these visits do a lot of good.

In the interests of the industry, facilities should be made available to enable visitors to become familiar with what has been accomplished by mine operators here, and to permit them to form correct opinions with regard to the possibility of making new mines. We have very promising mineral areas which require large sums of money for their development. There is opportunity in Northern Ontario alone for the spending of many millions with a reasonable chance of success. If we had more visitors from London, English capital would not neglect the opportunities here to the extent that it has done.

THE BELCHER ISLANDS.

Reports of iron ore discoveries at Belcher Islands have been not taken very seriously by many people, but a few interested parties are strong in their belief that the makings of an iron ore mining industry exists in these islands in Hudson Bay. In this issue of the Journal will be found some excerpts from an article by an American iron mining engineer who examined the deposits last summer. His remarks indicate that enough is now known to warrant considerable expenditure in diamond drilling and other exploratory work, to determine whether the deposits are good enough to warrant the heavy expenditures necessary to develop and operate producing mines.

The Dominion Government has evidently been somewhat impressed with the possibilities of establishing an iron mining industry in the Far North, for there is now a geological survey party making an examination of the Islands for the Government, Dr. G. A. Young is in charge of the party and his report should be of interest.

Mr. Woodbridge is not unmindful of the difficulties of transportation and of the inhospitable climate and it is therefore doubly interesting to note that he is confident that the obvious difficulties will be successfully overcome if development is reasonably satisfactory.

ONTARIO MINERAL EXHIBIT.

While there is very little at the Toronto Exhibition to suggest that mining is a very important industry in Ontario, an endeavor is made by the Department of Mines to have on view minerals from the chief producing districts. In the small place allotted to the Department of Mines in the Government building, there are shown nickel and copper ore from the Sudbury district, gold ore from Porcupine and Kirkland Lake and silver ore from Cobalt.

The gold exhibits include some very rich specimens from the Croesus ine and some new ones from the Dome mine. Less spectacular are the specimens from the Hollinger and McIntyre mines and from the Kirkland Lake district. Among the silver specimens are slabs of silver from the Coniagas and Trethewey mines. A novelty is a statuette of silver with a base of silver ore. This was designed by J. D. Kelly of Ralph Clark & Sons and modeled and cast by Canadian Wm. A. Rogers Ltd.

Messrs. Jamieson & Peacock have sent in some specimens of silver ore from the Silver Islet mine, Lake Superior, and W. A. Taylor and W. E. Jones show samples of molybdenite from Eastern Ontario.

Exhibits of non-metallic minerals include feldspar from Eastern Ontario, graphite from Calabogie, gypsum

from Caledonia, fluorspar and talc from Madoc, mica from Sydenham, fireclay from Mattagami river and corundum from Craigmont.

An interesting feature of the exhibit this year is the number of maps which show the locations of mining districts and the geological features of the mining areas.

Mr. Wm. McNeil, Provincial Assayer, is in charge of the exhibit.

THE McINTYRE REPORT.

The reports that will be read with interest by a large number of shareholders and others interested in gold, silver and coal mining are those now being prepared by the McIntyre, Temiskaming and Blue Diamond companies. The gold and silver mining companies operate at Porcupine and Cobalt respectively and both are financially interested in the Blue Diamond coal mine in Alberta. In one next issue we will present a summary of the reports of the three companies. The results of operations during the past year are fairly well known, but our readers will be interested in studying the reports to see how the results were obtained and to form a better idea of the prospects for the coming year.

A PLEA FOR CONSISTENCY IN EDUCATION.

A great deal is spent upon education. Something useful learned, even if purchased at a high price, is a definite gain.

There is, however, a tendency to take too narrow a view of education and to under-estimate the importance of the seemingly minor influences to which the learner is subjected. They are not included in the conventional curriculum but form a branch of education secured by the student himself, apparently without effort, and they attach themselves so securely to his mind that their impressions are never eradicated.

It is towards these influences that we, who love our country and believe that the chief objects of education are to inculate the love of the homeland and adequately prepare its future citizens for its defence, maintenance, and progress, may very profitably direct some attention.

One influence is the presence in universities, colleges and technical schools, of scientific instruments of foreign origin, in excessive proportion. We rightly teach our child that our nation is endowed with originality in design and skill in workmanship, that there are no goods to equal the British, and then prove our point by presenting him with a Swiss watch. In the advanced stages of education, we dilate upon the engineering triumphs of our nation, and present the youth with a German set of drawing instruments. Later on, he sets out to foreign parts and he is to be congratulated if his kit does not contain any instruments except those of British manufacture.

The position is distinctly humiliating. In the stress of war, we were obliged to make scientific instruments and apparatus for ourselves, and surprising advances were made in many branches, old-fashioned firms extending, producing new and improved designs, and meeting exacting demands with everything against them except the financial aspect. If Germany had not given us time to train our workers, we could not have won the war.

We have trained workers, extended and up-to-date works available, but these must be idle because the articles in question can now be purchased from abroad at lower prices. Many thousands of lives were lost and many millions of pounds spent in the early days of the war because we had not sufficient skilled workers available to produce the munitions requisite. A standing army of skilled workers is now available; it is being rapidly disbanded and will soon cease to exist in any but a pre-war condition. This army desires to be self-supporting. It calls upon you and me individually to do our part. Government restrictions on imports may hold some part of it together and may even foster and improve some sections, but real advance will be the result of individual effort. In an ordinary school, no text-book of English history would be countenanced which belittled our country and glorified the foreigner.

It is an essential of education that it shall prejudice youth in favour of its Motherland. In the matter of book learning, this practice is strictly followed and is highly commendable. In the technical schools, where hard facts are taught, we very frequently find foreign scientific apparatus being used, foreign drawing instruments—not always because British are unobtainable, but for a difference in first cost, by which saving the minds of a generation of students are prejudiced in favour of foreign manufactures. Technical teachers have a great responsibility and a great opportunity.

The position of the scientific instrument trade at the present time is that many articles, formerly purchased from abroad, can be made equally well in this country; some are even better than their foreign rivals. Others are steadily improving but need a sympathtic encouragement, and others are in need of considerable financial support to cover the research and experimental work necessary for success.

This article is not a plea for Government protection or subsidy, but for the individual and sympathetic assistance of professors and lecturers.

An alien enemy would not be countenanced in the professional chair. Why, then, tie the students to foreign apparatus and instruments, the very atmosphere of which is charged with prejudice against this country's goods? Manufacturers are ready to consider any reasonable propositions, and some would even lose money for a time on the instruments they supply to technical schools and colleges, sooner than admit the foreign articles.

A start might be made by professors and teachers forming an association for the determination of the best patterns, for placing bulk orders, and distributing advantageously to the various schools and colleges, and for carrying out individually and collectively, such research work for improvement as their disposal will admit. If students leave the technical schools and colleges prejudiced against their own country's manufactures, and placing their reliance and support in foreigners, the technical teachers may rest assured that no plea of apathy on the part of the Government will free them from the condemnation which must fall upon them for neglecting so great and noble opportunities.

—B. J. H. (In "Pitman's Technical Bookshelf.")

DAVIDSON.

The Davidson mine is being dewatered preparatory to resumption of operations. It is expected that development on a large scale will follow completion of the financing arrangements.

Production of Metal Mines and Works

Ontario Returns Show That While Gold Is Increasing The Production of Other Metals Shows a Heavy Falting-Off.

Returns received by the Ontario Department of Mines from the metalliferons mines, smelters and refining works of the Province for the six months ending June 30th, 1921, are tabulated below. For pnrposes of comparison the quantities and values are given for the corresponding period in 1920. Tons throughout are net tons of 2,000 pounds.

first quarter of the year was responsible for curtailing the tonnage of ore treated.

The Wright-Hargreaves at Kirkland Lake joined the ranks of producing gold mines in May when the new 150-ton mill was put in operation. The Argonant mill in Gauthier township was burned on May 29th. However, active development at that property is proceeding.

Summary of Metalliferous Production.— First Half of 1921.

Product		Quantity		Value $	
		1920	1921	1920	1921
Gold	ounces	277,656	286,018	5,690,504	5,761,504
Silver	ounces	4,474,322	4,277,762	5,077,028	2,552,125
Platinum metals	ounces	184	941	12,443	26,317
Copper sulphate	lbs.	89,935	87,382	4,497	3,495
Copper, metallic	lbs.	2,918,153	2,297,732	470,949	272,132
Copper in matte, exported*	tons	4,434	344	1,241,520	55,040
Nickel in matte, exported*	tons	9,527	814	5,338,120	407,000
Iron ore, exported	tons	2,189	22	18,512	99
Iron, pig†	tons	28,771	27,147	738,079	733,568
Cobalt, metallic	lbs.	113,239	30,423	266,045	91,355
Cobalt oxide	lbs.	388,318	99,533	645,783	204,853
Nickel oxide	lbs.	3,491,544	31,078	814,070	65,652
Nickel-Cobalt oxides, nnseparated	lbs.		26,592		29,720
Nickel, metallic	lbs.	4,854,979	21,773	1,696,687	1,479
Other Nickel compounds	lbs.	159,183	111,279	15,308	9,991
Other Cobalt Compounds	lbs.	1,417		1,029	
Lead, pig	lbs.	749,820	1,504,830	71,006	79,322
Total value				$22,101,580	$11,363,652

* Copper in matte was valued at 13 cents per pound in 1920 and 8 cents in 1921, while nickel in matte was valued at 25 cents per pound for both years.

† Total ontpnt of pig iron was 244,346 tons worth $6,602,772. Figures in the table represent proportional ontpnt and value of product from Ontario ore.

General Remarks.

With the exceptions of lead and gold a marked decline is noted in Ontario's metalliferons outpnt for the first half of 1921 as compared with the corresponding period in 1920. The mining industry is experiencing a poor market and a general lowering of commodity prices in common with many other industries. Considering the shortage of hydro-electric power during the first quarter of the year, together with the slnmp in the price of silver, the ontpnt of this metal is creditable. Gold mining which was carried on during the war period nnder adverse conditions, is now on a solid basis, and gives promise of showing a yield for the full year in excess of any record heretofore attained. Details regarding the principal items are given under separate headings.

Gold.

Production of gold for the half year shows an increase of $71,000 in value over the 1920 figures. The significance of the increase will be noted when reference is directed to the output for the first quarter of the year which was $656,514 less than in 1920. Thus the net increase in production for the second quarter of 1921 is $726,514. Hydro-electric power shortage during the

The McIntyre at Porcupine is doubling its milling capacity which at present is 550 tons daily. At the present rate of production, the total outpnt of gold in Ontario for 1921 will be about 13 million dollars, as compared with 1920 when it was $11,665,735.

Canadian nickel-copper refineries recovered 121 ounces of gold worth $2,425. Apart from values given in the table below, gold-mining companies received in addition approximately 13 per cent of the gross value of the ontpnt by way of exchange premiun, amounting to say $750,000. This bonus by which the industry profits is an added stimulus to gold-mining in Ontario. With lowering production costs it is expected that other mines which were forced to close down during the war will soon re-open and join the ranks of the producers.

Nickel-Copper.

Owing to an overstocked market for these metals, the operations of mining nickel-copper ore, smelting into Bessemer matte and refining for the recovery of nickel, copper and subsidiary precious metals, have been greatly curtailed. In the United States practically all the copper mines have closed down, the average New York price of electrolytic copper having declined from 19.01 cents per pound for the first half of 1920 to 12.67 cents

for the period under review. Nickel is in little demand for armament purposes and industrial business is slack. In consequence, the production for the first half of 1921 is much below that for 1920 when a temporary revival in business, stimulated by high prices, was in evidence. At the time of writing, both the Nickelton and Copper Cliff smelters are closed down, as are also the refineries at Deschenes, near Ottawa, and at Port Colborne, belonging respectively to the British America Nickel Corporation and the International Nickel Company of Canada. The Mond Company is operating only one converter and has made no shipment of matte this year to the Company's refinery at Clydach, Wales.

During the period 241,991 tons of ore were smelted from which 12,785 tons of matte were produced. Of this latter quantity 1,403 tons were exported to the United States, and 5,039 tons shipped to Deschenes and Port Colborne. Nickel-copper matte refined totalled 4,069 tons from which 2,297,732 pounds of electrolytic and blister copper were recovered. In addition there was a recovery of 121 ounces of gold worth $2,425; silver, 5,666 ounces worth $3,258, and platinum metals in impure form and also as slimes, 941 ounces valued at $26,317. Aside from the metals 108,915 pounds of nickel plating salts (nickel sulphate) were marketed, also 318,732 pounds of nickel oxide.

Iron Ore and Pig Iron.

With the exception of a small sample shipment of hematite from the Wallbridge mine near Madoc, no iron ore was shipped from Ontario mines. At the Magpie 42,198 tons of siderite ore were raised. Both the Magpie mine owned by the Algoma Steel Corporation and the mine at Sellwood owned by Moose Mountain, Limited, are idle at the present time.

Six blast furnaces of the Algoma Steel Corporation, Midland Iron and Steel Company, and Steel Company of Canada operated for an average of 117 days during the period. A total of 490,224 tons of ore was smelted of which 57,454 tons or 11 per cent were of Ontario origin and 432,770 tons imported. Of 244,346 tons of pig iron produced 153,671 were used in steel making, the output of the latter product being 245,116 tons valued at $9,133,184.

Silver.

The New York price for foreign silver for the half year averaged 59.9 cents per fine ounce as compared with $1.17 in 1920. For the Ontario producer the exchange premium is to be added. Power shortage greatly curtailed production for the first quarter of 1921, but the total for the half year approaches the 1920 output in quantity. Several properties are being reopened following the shut down from power shortage and the drop in silver prices.

Shipments were made from the Miller Lake O'Brien and Castle mines at Gowganda, and from the Keeley mine in South Lorrain. Shippers of over 100,000 ounces are given in order: Nipissing, O'Brien, Coniagas, La Rose and Mining Corporation of Canada. Total shipments by silver mines were 4,224,326 ounces worth $2,520,866. Gold mines recovered 47,771 ounces and nickel-copper refineries 5,666 ounces. Shippers received $19,266 for 83,875 pounds of cobalt contained in ore and concentrates.

Refineries: — During the half year the three southern Ontario refineries treated 1,282 tons of ore and concentrates and 2,251 tons of residues, for a recovery of 2,024,628 ounces of silver, in addition to arsenic, cobalt, nickel, and compounds of the two last-mentioned metals. Shipments of recovered products were small owing to a poor market. In the above table, nickel hydrate and sulphate are included under the heading "Other Nickel Compounds". Nickel sulphate was produced from nickel-copper ore, and copper sulphate from silver-copper ore.

GOLD PRODUCTION.

Source	Daily Milling Capacity tons	Ore Milled tons	Gold Recovery ounces	Gold Recovery Value $	Silver Recovery ounces	Silver Recovery Value $
Porcupine						
Dome	844	152,880	45,426.7	939,053	6,566	3,877
Hollinger	3,500	426,425	171,257.8	3,420,811	32,109	18,219
McIntyre	550	76,119	40,122.7	829,408	7,434	4,345
Total	4,894	655,424	256,807.2	5,189,272	46,109	26,441
Kirkland Lake						
Kirkland Lake	150	22,382	5,285.6	109,262	887	508
Lake Shore	60	10,423	9,244.7	191,190	682	399
Teck-Hughes	120	16,073	8,022.4	165,837	656	393
Wright-Hargreaves	150	8,136	6,537.1	103,518	437	260
Total	480	57,644	29,089.8	569,807	2,662	1,560
Grand total	5,374	713,068	285,897.0	5,759,079	48,771	28,001

EXPLORING SILVER ISLET MINE.

Exploration work is well under way at the old Silver Islet mine where an attempt is being made to find ore deposits similar to the one that was worked several years ago. The mine has been dewatered to blow the 250 ft. level and an exploration crossent is being driven at that level in an endeavor to pick up new silver veins.

BAUXITE.

Reports of the production of bauxite in 1920 again show this ore of aluminum is being produced in quantity only in two countries United States and France, the former producing during the year 529,695 tons and France 186,693 tons. The American production is valued at $3,217,345. A good deposit of bauxite in Eastern Canada should find a ready market.

THE GOLD DISCOVERY AT ELBOW LAKE, MAN.

By Professor R. C. WALLACE, Commissioner of Northern Manitoba.

In the Canadian Mining Journal of July 1st, Mr. J. P. Gordon has already described in a brief note the essential features of this discovery. The following details will serve to supplement the facts which Mr. Gordon has noted.

Location.

Elbow Lake is an expansion of Grassy River which flows eastwards through the mineral belt into the Nelson River, into which it empties above Split Lake. The Grassy River, which flows northeastwards into Elbow Lake, makes a sharp "elbow" turn immediately on entering the lake and flows southwards without traversing the main body of the Lake. The discovery was made by the Murray Brothers at the water level on the southgoing arm of the river at the extreme south end of the Lake. The distance N.N.E. of The Pas is 65 miles. By summer travel the district may be reached either through Sturgeon Landing or through Herb Lake, in 2½—3 days travel from The Pas. To Sturgeon Landing there is steamboat connection. To Mile 82, 10½ miles distant from the south end of Herb Lake one may travel by train or gas car.

Geology.

At the south end of Elbow Lake a narrow band of green stone strides in a north and south direction and is intruded by granite on its east and west margins. The discovery was made on the east contact, and on the east bank of the river immediately below the first band after leaving Elbow Lake. The granite, which has intruded the greenstone is at this place a fresh red hornblende granite, itself heavily mineralized with pyrite near the contact. There is no definite line of contact, but rather a contact zone, a quarter of a mile or more in width, in which the greenstone has been partly or completely fused by the granite. The granite has been considerably altered by the process and the rock which in the field has been termed a porphyry, in which the quartz bodies lie, is a porphyritic phase of this intrusive granite, in type almost a quartz porphyry in places. There are other phases of contact rock as well, dark massive syonite, felsites and silicified greenstone; and through the whole zone run irregular veinlets, sheets and masses of quartz. The continuity of the individual bands of quartz, both horizontally and vertically, is very uncertain. The presence of a very considerable amount of quartz in the contact zone is, however, assured. Further in the greenstone, on the west side of the river, the quartz is found in regular veins following the strike of the greenstone. In the contact zone the most typical form is probably sheetlike masses lying approximately horizontally between the layers of "porphyry" rock.

Mineralization.

The discovery was made at what is now the south end of the Murray claim, where at the water's edge there now shows a band of gold approximately three inches by nine inches in a narrow vein of quartz. Immediately north of this very fine showing a trench has been cut across the strike, but does not show any spectacular gold in the line of strike of the main discovery. In this trench, however, and in the main trench on the Murray Claim (350 feet north of the discovery) the masses of quartz carry visible gold, and are of undoubtedly high grade. Six bands or shoots of quartz were noted in the main trench (75 feet long) varying in width up to three feet. The trench cross-sections only the west side of the contact area and might be continued with advantage right across the zone, as the rock on the east side of the hill shows more quartz than in the trench. Again at the north end of the next claim (contact) 3000 feet north of the discovery, considerable quartz occurs in the rock, and has been found to carry free gold.

Pyrite occurs in the granite to the east, in the quartz and in the "porphyry" throughout the property, usually, fine-grained, but occasionally in large cubes which have been formed in drusy cavities. Further south magnetite and galena occur, the former in bands which may be of economic value, the latter sparingly in quartz veins in the intruded greenstone.

Economic Possibilities.

The Murray and Contact claims are staked on a contact zone between granite and greenstone, in which there is a variety of intermediate rock, and irregular quartz lenses and sheets with very high values in gold. Both the quartz and the contact rock carry considerable pyrite. The gold-carrying quartz must be worked, not by itself, but as part of the whole rock body, owing to the fact that the quartz intrusives are irregularly distributed in the zone. It will therefore be necessary by surface sampling to locate sufficiently large bodies of quartz and country rock which may be worked in a large scale way by glory-holing or in wide stopes. Whether this may be possible in the large trench depends entirely on what the country rock will carry in gold to supplement the high values in the quartz bodies. In our opinion the "porphyry" will carry better on the east side of the hill facing the muskeg, as the country rock seems to contain on the whole more quartz in that area. In view of the remarkable distribution of gold in the quartz, there is the opportunity in this property and on this contact generally, for prospecting an orebody of large size with sufficient values for large scale operation. There is the advantage in this rock as well that there is no need to go to the expense of diamond drilling. Surface trenching and cross-channel sampling will give an accurate evaluation of the property for preliminary purposes. The work already done on the property has been well done. To mention a minor consideration, on many properties it would be possible to take exception to the way the lines are cut if regulations are to be strictly adhered to. That is not the case on the Murray and Contact. Further surface trenching will be necessary in order to explore the whole zone, but even at the present stage the property is open for examination.

The eastern contact at Elbow Lake southwards to Island Lake is good prospecting ground and will doubtless be carefully worked over before the summer is over. The mineralization is good, the contact is wide, and there is easy water communication throughout the whole contact belt.

PERSONALS.

Mr. C. E. Macdonald, formerly sales engineer with the International Nickel Company of Canada, Ltd., has severed his connection with that concern and has taken over the Canadian management of the Electrical Alloy Company. As resistance wire which is the large end of the business of the Electrical Alloy Company, consists entirely of nickel alloys, Mr. Macdonald's experience with the International Nickel Company of Canada, Ltd, should eminently fit him for his new position

Relation of Drilling Campaign to Income from Oil Properties

By W. W. CUTLER, Jr., (Petroleum technologist, U.S. Bureau of Mines, Interior Department) and WALKER S. CLUTE (Assistant valuation engineer, Oil and Gas Section, Internal Revenue, U.S. Treasury Department).

An oil-field drilling campaign is used in this paper to signify the spacing of the wells to be drilled as well as the drilling program, which is interpreted as the number of wells drilled in a unit of time. This has an important bearing upon the time of receiving income, as well as upon the amount of revenue obtained. In periods of low prices for oil, such as the present, the margin of profit is at the best very small, and the correct determination of the drilling campaign may be the deciding factor between incurring financial loss or gain during the depressed period.

General Policy of the Operator.

Drilling should be planned by the field engineer to conform with the general policy of the operator. This policy may be one of conservation during the early life of the property, but as mentioned later, this may result in a smaller ultimate recovery. It often occurs that the market price of oil does not warrant rapid development, or it may be desirable to hold in reserve a supply of oil for a refinery. The policy may be to recover all of the oil as quickly as possible, or it may be to maintain a constant and sustained production. In any case, the operator should outline as far as possible a definite policy, and should understand the principles underlying the recovery of oil, the influence of rapidity of drilling and effects of spacing, in order that he may obtain the oil as required with the least expenditure.

Loss of Recovery of Oil From Delay in Drilling.

During the early life of a pool, wells are brought in with large initial productions. As the pool becomes older, there is a marked decrease in initial production of new wells due to a fall in gas pressure. Naturally a loss in recovery per acre follows a delayed drilling program, owing to the smaller initial production of wells and also in some cases to the effect of drainage. The drainage factor is important to the operator if his property has not been protected properly by line wells.

In order to obtain the maximum amount of oil from a tract, a fast drilling program is necessary, thus obtaining wells of relatively large initial production, and consequently large ultimate production. Such a drilling program, however, is often impracticable. The drilling of a large tract must necessarily extend over a number of years. The crude oil market, with its supply-and-demand factor, the cost of materials, the building of roads, the need for drilling offset line wells first, and the financial condition of the company often prevent following the most advantageous drilling campaign.

The percentage loss in ultimate production which an operator will sustain due to delay in drilling will vary with the amount of other drilling in the same pool, the size of the pool, the size of the undrilled tract, the amount of delay in drilling, and the amount of protection which the operator has obtained by offset wells.

Determination of Drilling Campaign.

An operator's first consideration is to drill offset line wells in order to protect his property from drainage by neighboring wells. By staggering his line wells with the neighboring line wells, an operator will develop areas which are less affected by drainage than they would be if the neighboring line wells were directly offset, thus increasing the probable recovery from his protecting line wells.

After this is done, the drilling should proceed according to a definite plan conforming with the general policy of the company. Drilling generally progresses either blanket fashion across a property from proved territory to unproved territory, or may spread outward from test wells used as centers from which adjacent locations are drilled successively.

A scattered drilling campaign consists in maintaining between wells as great a uniform spacing as practicable (for example, 15 to 30 acres per well on large tracts) during the early development period; then, after the scattered wells and the line wells have been drilled, the drilling campaign is completed by sinking intermediate wells whose proper spacing has been calculated by a study of the decline of the producing wells.

This method has two distinct advantages: the initial productions of scattered wells are, as a rule, considerably higher than those of wells spaced according to the usual practice in the oil fields; and production from widely spaced wells is better sustained than that from wells closely spaced. This excess in production is maintained until the drainage areas of the adjoining wells encroach upon one another. At this point, however, the decline of the wells becomes greatly accelerated. A loss in the ultimate production per acre may result from first spacing wells widely, and then interspacing.

Early wells in isolated positions, having relatively high initial productions and following with several years of sustained production, will during these years yield to the producer decidedly greater and quicker returns of revenue than would the same number of closely spaced wells, which are as expensive to drill yet have a lower average yearly production.

When it is necessary to continue drilling during periods of low market prices for oil, the relatively large initial and sustained production of isolated wells results in a reduction of the number of wells necessary to produce a given amount of oil, and the cost per barrel of production. Interspaced wells may later be drilled when the market price of oil warrants the further expenditure.

A scattered drilling campaign, as formerly pointed out, consists in maintaining the greatest practicable spacing between wells during the early development period. It was also mentioned that this may result in a smaller ultimate production per acre. The loss occurs through drainage away from the property and through incomplete recovery by interspaced wells that are brought in later after the gas pressure has decreased; but in some cases such loss may be more than compensated by the advantages that arise from scattered drilling, namely, the earlier return on the investment through large initial and sustained production, postponement of the time when wells have to be pumped, the possible elimination of drilling unprofitable wells,

and a better final spacing of the wells, based upon the production data accumulated during the drilling of the relatively few isolated wells and the line wells.

The production decline of an isolated well becomes accelerated when its drainage area is encroached upon by interspaced wells, as is shown by records from nearly any field. Therefore, the benefit to be derived by drilling scattered wells is negligible if it is followed with a rapid drilling program of interspaced wells. In other words, the scattered drilling campaign may be applicable and of benefit where a large tract is to be covered by a long program extending over a considerable number of years.

An offset campaign consists in drilling wells near wells already producing (one location removed, corresponding to 3 to 10 acres per well), possibly working from one, two or more wells as centers. A scattered drilling campaign of a given number of wells necessarily requires a slightly greater initial investment than an offset campaign, as a greater territory must be developed at one time, including, more extensive road, power, water, gas, and oil pipe-line facilities.

Tight and irregular sands are not affected so materially by scattered or offset drilling campaigns. An extreme example of this is found in the Gulf Coast salt dome fields, where in unusual cases due to irregular sand conditions, wells 100 feet away from producing wells are brought in with initial productions equal to or greater than that of isolated wells, and declines are not affected by near-by wells. This is usually accounted for by the fact that the later well has drilled into a sand which has not been drained by the original wells. In the salt dome fields, also in the districts of California that produce very heavy oil, wells are often properly spaced as close as 1 acre per well. Also in the Mexican fields the underground conditions present such irregularities that the ordinary relations between neighboring wells may not apply.

It may be desirable to an operator from an economic standpoint to produce and market all available oil at the earliest possible time, thus insuring the early return of expended capital for reinvestment. In small tracts this is often accomplished. There is of course a high immediate recovery when a tract is quickly drilled with closely spaced wells in the early life of the field. The wells are relatively large, their initial productions being high, due to unimpaired gas pressures. In such a case, with small tracts or town lots, close spacing is practiced. Too close spacing is detrimental to the field as a whole, since the gas pressure falls off and its sustaining influence is lost to neighboring operators who might otherwise benefit from securing sustained production while their long drilling programs were in progress.

Only an agreement between operators regarding the spacing of wells can gain for the field the benefits to be derived from maintaining gas pressures, thereby securing sustained production for all properties concerned.

It has been noted (Beal, Carl H., White, Norval, and others, "Manual for the Oil and Gas Industry", published by the Treasury Department, 1919. Discussion of Buena Vista Hills area, Midway Field, Calif., p. 115. Beal, Carl H. and Lewis, J. O., "Some Principles Governing the Production of Oil Wells", Bull. 194, U. S. Bureau of Mines, pp. 25-27), that the production of widely spaced wells was more sustained than that of wells closely spaced.

A study of the past performance of wells in fields throughout the United States was undertaken to ascertain the extent of the gain in production from wells that were widely spaced as compared to closely drilled wells. Of the fields examined, the Speechley pool, Butler County, Pennsylvania; the Nowata district, Nowata and Rogers Counties, Oklahoma; the Bartlesville-Dewey district, Oklahoma; the Hewitt field, Carter County, Oklahoma; and the Buena Vista Hills area, Calif., furnish typical examples of the difference in production that may be expected from widely and closely spaced wells. Average production decline curves were drawn both for the widely spaced wells and for the wells in closely drilled areas, which indicated a very considerable increase of recovery per well in favor of the widely spaced wells.

From the tables prepared, an interesting relation is noticeable in both the ratio of ultimate production per well and the ultimate production per acre. For example, in the table of the Nowata District, Oklahoma, wells with an initial production of 6,000 barrels to the acre show with closer spacing, a decrease in the ratio of ultimate production per well as follows: 100-90-84.5; while wells with an initial production of 4,000 barrels have a decrease of 100-89-84.5, which is almost similar to the above. A corresponding similarity (although increase and not decrease) is noted in the column of ultimate production per acre. In both cases this likeness was so marked in these several pools, that the conclusion is that both the percentage of loss per well and also the percentage gain per acre due to closer spacing is almost the same regardless of the size of the wells. The ultimate production for wells of equal size in the same pool, where there is interference (shown by a difference in the production decline curves for different spacing) appear approximately to vary directly as the square roots of the areas drained by the wells. This may be stated that the recovery from wells of equal size in the same pool and producing under similar conditions is proportional to the average distance that the oil moves to get to the well. As no production records were available for very closely spaced wells (1 or 1½ acres per well), it cannot be stated whether this relation is applicable to wells of such spacing.

By employing the relationship above stated, production decline curves for wells of different spacing in the same sands may be derived from a given production decline curve for wells of a known spacing. The present value of the property obtained by discounting the annual returns on the amount of oil that will be received by the spacing in actual use, may first be calculated. Next, the rate of recovery and present value of the tract for different spacings may then be estimated, and thus the spacing determined which would provide the greatest present value.

The initial production of wells to be drilled may be estimated by determining the time of completion and the production that the old wells in the vicinity will be making at the time of bringing in the new wells, as estimated from the available production decline curves. This production figure may be taken as roughly indicating the probable initial production of the new wells. In general, as will be seen by referring to the above tables, the larger the initial production of wells, the closer the spacing may be, the gain in production per acre by closer spacing corresponding with the greater initial productions. If the production of wells in different parts of the tract varies, suitable spacing should be used for these different localities. Close drilling results in a greater recovery per acre, but the added income resulting from closer spacing must be balanced

against the added cost of drilling and operating more wells, in order to determine the spacing that will produce the greatest return in dollars and cents for the tract in question.

The above method of planning a drilling campaign permits an operator to follow his policy, either of maintaining a constant production or of obtaining the greatest profit possible out of his property.

In determining the drilling program for a small tract, or a tract drilled rapidly, the proper spacing may be deduced by considering the average production decline curve of the pool or district, the average spacing it represents, and the size of neighboring wells.

The determination of the proper ultimate spacing for a large tract need not be undertaken until after the protecting offset line wells have been drilled, and for tracts where wells have been drilled according to a scattered program, until after the completion of the isolated or scattered wells. Deferring this determination until line wells and scattered wells have been drilled gives the operator the benefit of accumulated records covering production, and development costs, and a later date of estimation as to the future market price of oil.

Conclusion.

The drilling campaign has a direct bearing on the time of receipt as well as the amount of income which a property will produce.

The drilling campaign must be planned to conform with the general policy of the operator.

A definitely determined drilling campaign enables an operator to plan better the development of a property, and to secure the greatest profit from his investment.

The following program is suggested for drilling in proved acreage:

(1) Protect the property by offsetting line wells of neighboring properties.

(2) Use a drilling program sufficiently rapid to conform with that of other operators in the same field, thus utilizing the high gas pressures which exist in the early life of the field and thereby recovering a greater percentage of the underground reserves of oil.

(3) Determine the drilling campaign by weighing the necessity of securing greater immediate recovery of oil by scattered drilling against the greater ultimate production that would be obtained by offset or blanket drilling.

(4) Determine the proper ultimate spacing of wells by using the production decline curves for the early wells already drilled.—U. S. Bureau of Mines, Reports of Investigations.

EUROPE'S GOLD RESERVES.

While Europe sent to the United States more than two hundred and fifty million dollars in gold during the first six months of the current year above receipts from the United States, nevertheless according to information compiled by the National Bank of Commerce, New York, a slight gain occurred in that period in the total gold reserves of Europe held by central banks or government agents.

Only three of the fourteen chief European gold holding countries showed a diminution in their gold stocks from January 1 to July 1, and these losses were relatively slight, their combined total amounting to less than twelve million dollars. The loss was more than offset by gains among the other eleven countries, the net increase of the fourteen combined amounting to $1,199,000.

Yet between January 1 and July 1, the gold stock held by the Federal reserve banks in the United States increased by $402,601,000 or nearly 20 per cent. of the $2,059,330,000 they held the first of the year, almost two-thirds of the increase being made up by the gold from European shipping points, the rest coming from non-European and domestic sources.

Increments From Three Sources.

An analysis of this gold movement shows that present European gold reserves are not being drained to swell America's holdings but that the increments to the United States hoard since the first of the year, in so far as shipments from European points are concerned, are chiefly accounted for by three great streams of the metal consisting of newly mined supplies from Africa coming by way of London; of gold yielded up by India, also coming by way of London; and of metal thought to have originated from Russian sources, eventually coming to America through various European countries.

Europe's centralized reserves were built up subsequent to the outbreak of the Great War far above prewar figures, and were further increased since the Armistice, by concentrating in them as far as possible all gold privately held. While these reserves have been, by continued government impoundage, kept rigidly stabilized at the points attained as a result of those extraordinary war and postwar measures, in the face of the recent tremendous suction toward America, nevertheless the three great streams have flowed through these countries to the United States with little impediment during the last six months. No material effort has been made in Europe to divert the gold from them for the purpose of building up further the reserves there. The gold has served to reduce European indebtedness in America rather than to aid in restoring the gold standard in Europe.

Russian Gold Came Indirectly.

It was stated in the Federal Reserve Bulletin for June, 1921, that the Director of the Swedish Mint had recently estimated that seventy tons of Russian gold were received in Sweden since 1920. He was quoted as saying that after refining it was re-exported, chiefly to the United States, representing an assayed value here of about $40,000,000. The bulletin also said that not less than another $60,000,000 of Russian gold or its equivalent had found its way to the United States through France and other channels.

The movement of gold from Russia to the United States is not definitely traceable. It is thought to have come to this country indirectly through various continental countries in addition to those mentioned above. At the outbreak of the war in 1914 the Russian State Bank held $779,750,000 in gold; by the end of 1917, the date of the last definite statement of gold held in the bank, the stock had dwindled to $633,000,000. It has been reported that this balance has since been largely dispersed and the amount remaining is unknown, but is thought to be small.

It appears therefore that the United States received, between January 1 and July 10, the equivalent of $106,599,000 of African and Indian gold by way of London and the equivalent of more than $100,000,000 of Russian gold by way of Continental Europe. These three chief sources account for the fact that Europe as a whole has been able to make substantial gold payments to the United States without further impairing her existing centralized gold stocks.

BELCHER ISLANDS ORE DEPOSITS.

The discovery of important iron ore deposits in the Belcher Islands, Hudson Bay, has been commented on several times in these columns. Interested parties have had some very favorable reports on the deposits; but the published reports have not been very favorable, owing, possibly, to the poor impression the deposits made on one writer who visited the Islands some years ago.

Recently, however, one of the engineers who examined the deposits last year gave out some information in an article written for the Engineering and Mining Journal which would lead one to think that the possibilities of establishing an iron mining industry on Belcher Islands are quite good.

Mr. Dwight E. Woodbridge, the writer of the article is a well known authority on iron ore mining and his assistant Mr. Geo. H. Rupp is an experienced iron ore mining engineer.

Mr. Woodbridge says in part: During the summer of 1920 I made an examination of the iron formation of the islands, assisted by George H. Rupp, a mining engineer from Ironwood, Mich. That part of the islands examined consisted of the greater portion of the northern half of the group, roughly speaking lying north of Parallel 56, North Latitude.

Such a journey as I took to the Belchers is unusual and remarkable, for at present the only way to get there is by a roundabout course afforded by rivers large enough for canoe travel, and across the bays themselves. We travelled about 500 miles by canoe and 900 miles, all told, by small motor boat. Hardships and disasters, more or less serious, are sure to be met. There are dense fogs which, in those seas, never shadowing a sail nor beaten by a wheel, with no lights nor aids to navigation, are hazardous in the extreme; there are frequent storms, for these northern latitudes are subject to sudden and severe winds; there is ice, and to run into it from windward in fog or wind is death to a thin-ribbed, river-built motor boat. There is the actual wreck of these boats, perhaps, and the usual untoward incidents always to be expected during a trip into a new and distant region where there are no accommodations nor facilities of any sort whatsoever. But all these would soon be forgotten if the region were to be opened and connected with the outside world. They would make an attractive human-interest story, but are not necessary to a discussion of the mineral possibilities of the Hudson Bay region.

Iron-bearing formations themselves are not usually of a quality that will permit their use in the blast furnace; they are generally too low in iron and too high in silica or other inert or deleterious elements to be commercial. A process of concentration, natural or artificial, must take place. Sampling of the formation at the Belchers, this sampling extending over a length of many miles, showed it to be of a grade comparing favorably with the iron formations around Lake Superior in their entirety. The average iron content of the 125 square miles of the Mesabi district, for instance, is computed to be about 30 per cent iron: about 50,000 drill holes in the Gogebic have given an average of about 35 per cent iron. The comparable average of the Belchers is about 38 per cent iron, with all samples of 50 per cent or better excluded from the computation. In considering this newly discovered area and in comparing it with other and developed districts, one must be mindful that it is a wide extending formation, and not mines, that are the basis of comparison. A spade has never been put into the ground on the Belchers, nor has there even been sunk a drill hole. The whole study is one of geologic possibilities and similarities, with comparisons of the great mass of the iron-bearing formation.

At the Belchers the iron-bearing formation shows a thickness up to 400 or 500 ft. and can be followed along its eroded edges for many miles. My own work included fifteen miles of outcropping, running up to about 400 ft. in thickness. The formation is underlain by quartzites and early limestones and is capped by various recent lava flows, several different flows being discernible. The foldings and the erosions have cut through all these, disclosing greenstones, similar to those of the Lake Superior region, and it is not difficult to formulate an ideal cross-section of the various rocks.

Extensive areas were found in the formation where there had been sufficient concentration of ore to present faces up to 25 ft. in thickness of an average iron content of better than 52 per cent natural iron. The ore is very dense and close grained, blocky, breaking in rhombohedral blocks, reminding one of the Newfoundland ores under the sea at Bell Island, and the moisture content is extremely low, considerably less than 1 per cent. But not enough commercial ore was disclosed by my examination to permit a recommendation that the development of mines, the construction of ships, docks, and a railway, were warranted without further and considerable definite knowledge to be derived from exploration by drill or otherwise. It was reasonably safe to assume the actual presence of commercial ore in minable thicknesses up to a tonnage of not far from a million tons, but this was altogether too little on which to base the large expenditures necessary. It is enough, however, to base thereon a material exploratory campaign. If concentration of commercial ore in such a field, in minable thicknesses, is obtained, the probabilities are that there is vastly more to be found by search, and it is not impossible that on these islands exists one of the greater potential iron-ore fields of the world.

The only inhabitants so far north are Eskimos, and there are thousands of them in the tributary regions, up to Baffin's Bay and Chesterfield Inlet. They are a willing, kindly, trustful, hardworking and happy race, amenable to reason and discipline. This I found not only from my own observations, but from the unanimous consensus of opinion of those who knew them well. They live in daily fear of starvation, without the slightest semblance of comforts or knowledge of the amenities of civilization. True, they probably would not exist long if too much comfort was accorded them, but if properly handled and properly fed with the only supplies they are used to—raw sea products and such other food as is natural to their habitat—and if assured of life from which the fear of starvation and drowning were removed, it is probable that the labor supply would be ample and excellent.

The Eskimos are physically and mentally able. They have to be, or they could not survive. Their life is and always has been a constant struggle against the sea and the climate, and that they exist at all is proof of their adaptability and the sharpness of their intellects. One will note the same condition among northern Norwegians of the older type—that same struggle for life with the sea and the rocks, and their mental alertness and characteristic aptitude are the results of conditions.

not so severe though of like type, as those under which the Eskimos live. These people are so built physically as to warrant the belief that they would make excellent miners. It is fortunate that it is not necessary to consider Indians as miners, for there is as much difference in the mental and physical attitude of the two races as there is between an I. W. W. and a man working on his own.

No timber exists on the islands or on the mainland adjacent, but on James Bay, 100 to 150 miles south, the rivers are channels through magnificent forests of spruce, and as yet of no value at all. Mining timber should cost at the islands not a third of what it now costs in the Lake Superior region.

The possibilities of this newly discovered iron-formation region are truly interesting, and the more it is studied the more clearly do they stand out and the obvious objections fade away.

THE HISTORICAL ACHIEVEMENTS OF COBALT AND PORCUPINE.

Isolated Centres of Production in a Vast Stretch of Territory—Largely Unprospected—Having Similar Potentialities of Mineral Concentrations.

By J. A. McRAE, Cobalt.

Gold and silver production measured in tons is the achievement of the district of Temiskaming, in Northern Ontario.

Less than a score of years ago, a mere stretch of wilderness, without a railway, and now producing three tons of gold bullion and thirty-five tons of silver bullion every thirty days; that is the achievement.

In 1902, Temiskaming was a district of unknown value. There were a few adventurers who believed in its agricultural possibilities and who were suffiently aggressive to encourage the Ontario Government to construct a "peoples" railway through the territory. In doing so, the more optimistic of these pioneers perhaps failed to entertain even an imagination of the enormous wealth which was to bare itself as the two insignificant strips of steel wound their arduous course northward from North Bay toward the height of land and beyond, laying their terminus on the great Clay-Belt which lies just beyond the crest and slopes toward the sub-arctic region of James and Hudson's Bay.

That was the beginning.

Eighteen years ago the existence of silver in the Cobalt district was not known. It was during the work of constructing the railway that the fact revealed itself. In its brief existence, the silver mining industry of Cobalt has enriched Canada to the extent of approximately 315,000,000 ounces of silver valued at $191,000,000.

Nor did success end here. Quite the contrary, the silver mining industry of Cobalt served as a stepping stone, as it were, to further important discoveries. Even now, gold mining has reached such giant proportions as to provide one of the important industries of the Dominion, and in Porcupine just a hundred miles north from Cobalt the richest and the largest gold mine in the Western Hemisphere, the Hollinger Consolidated, is operating and is producing gold at the rate of over $10,000,000 annually.

I have always believed that Canadians are generally quite poorly informed in respect to the mining industry of this country. I also believe the governments are made up of men who have not given the industry the consideration which its importance warrants. It is for these reasons that these details are presented.

The motive in doing this, is not to disseminate a few facts which in themselves now occupy a place in history, but to bring to the attention of citizens of this country the greatness of the industry so far developed and the magnitude of the future which seems to be looming up. Having in mind this fact, and mindful of the opinion of the mining engineers and mining geologists who are familiar with the territory and who point to the fact that where the mineral lands have been developed they have been found to be rich and that where they have not been developed they present an ideal field for prospecting, the situation may be summarized as follows:

Stretching north-east and north-west from North Bay, forming the east and west coasts of Hudson's Bay, also all of Northern Quebec, Labrador to Ungava Bay, and north into Northern Ontario, Northern Manitoba and a large part of the North West Territories up to the Arctic Ocean and Alaska, the country is composed of granites and gneisses, interspersed here and there with patches of Keewatin and Huronian rocks, the whole being known as the great Canadian Pre-Cambrian Shield, the basal formation of the North American Continent.

This great inverted horseshoe, as it were, encompassing Hudson's Bay, is the land of promise for the prospector and miner, for only a small portion of this vast area has as yet been carefully prospected. It contains thousands of square miles and offers to prospectors better chances of locating valuable mineral deposits than can likely be found in any other country in the world. The T. & N. O. Railway only taps the most southerly portion of this great area.

Therefore, measuring present production of precious metal in tons, and the developed area bounded on the east, west and north by territory of equal promise, those who are interested in the welfare of Canada and who desire to participate in the benefits arising as a consequence of the development of these vast resources, cannot well afford to fail to acquaint themselves with the achievements and the opportunities established and beckoning in this, one of the last great precious metal mining areas.

PERSONALS.

Mr. Alex. Richardson principal of the School of Mines, Camborne, Cornwall is returning to England after visiting mining districts in Canada and the United States.

Sir Archibald Mitchelson and party have returned to Toronto after visiting the Porcupine gold district.

Mr. J. E. Harley of Kingston has returned from Ecuador and is leaving now for India.

Mr. E. P. Mathewson has been engaged to examine the property of the Burma Corporation Ltd. He will consult with Mr. P. E. Marmion, recently appointed manager of the company, on policy to be adopted.

Mr. J. A. Holmes of Sudbury is in Toronto.

Mr. A. A. Cole, of Cobalt, is at Alfred, Ont., inspecting a peat excavating machine recently installed by the Peat Committee, of which he is chairman.

Dr. McIntosh Bell has returned to Cobalt after being for some weeks in Alberta oil districts. He is now at the Keeley mine, South Lorrain.

Geological Mapping of Canadian Cordillera

While Good Work Has Been Done in the Last Fifty Years Very Large Areas Still Remain Unmapped.

By ROBT. DUNN.

Dealing with the "Status of Geological Mapping in the Canadian Cordillera," Dr. Victor Dolmage, of the Canadian Geological Survey, states that this geological work was begun in 1859 when Hilary Bauerman began a traverse along the forth-ninth parallel; that his report which appeared in 1884 was unaccompanied by maps; that actual geological mapping was begun in 1871 by James Richardson, who studied the coal fields of Vancouver Island; and that from 1871 to the present over 90,000 square miles have been geologically mapped and about 4,000 miles of water routes traversed.

In the Terms of Union of British Columbia with the Dominion of Canada in 1870 it is clearly set out in Section 5, sub-section II., that the Dominion Government shall maintain and continue the geological survey in this Province. For this reason British Columbia has a special claim to the attention of the Canadian Geological Survey—a claim which it must be admitted has been well recognized of late years, the Pacific Coast Province having had at least its fair proportion of geological and topographical parties allocated to work within its borders.

Huge Work Yet to Do.

Still Dr. Dolmage's findings, unquestionably based on information carefully compiled from the records of the Canadian Survey Branch, is of special interest because it brings home the extent of the task before that organization. The area of British Columbia is placed at 372,630 square miles and yet from 1870 to the present only 90,000 sq. miles of the Canadian Cordillera has been geologically mapped. At this rate it would take at least 150 years to complete the work in this Province. But government officials are alive to the importance of the work now as they never were before. There is no doubt that from this time onward it will be pressed both for the reason that the data is essential scientifically and that it is invaluable as an aid to the economic development of the minerals of the country.

The change that has taken place in methods is explained by Dr. Dolmage when he says that about 42,800 square miles of the 90,000 square miles were done by early explorers on a scale of 8 miles to the inch and that "though some of it may be classed as good reconnaissance survey, much of it is only exploratory work. About 3,100 square miles of good reconnaissance were done on 6 miles to the inch by more recent workers. About 32,600 square miles were done on a scale of 4 miles to the inch, all of which work is good reconnaissance survey and some of it may even be classed as detailed work. About 5,800 square miles were mapped on one mile to the inch, all of which is detailed work and much of it very detailed. About 163 square miles of refined work were done on scales ranging from 400 to 2640 feet to the inch."

Two Classes of Work.

There is a division in the class of work done between that prior and subsequent to the present century. The former was of an exploratory or reconnaissance character; the latter has been nearly all detailed. Earlier period maps cover huge areas done on a scale of 8 to 4 miles to the inch while those of the later period deal with smaller much more thoroughly traversed areas.

The men of the earlier period are described as essentially stratigraphers who accentuated that phase of geology, devoting much of their time to areas underlain by sedimentary rocks. In the second period more stress has been laid upon petrography and the study of of igneous rocks. Economic studies during the earlier phase were largely of coal areas and placer ground—no doubt because those were the resources then receiving general attention and knowledge of which was generally sought—which now more attention is being paid to metalliferous deposits.

Complimentary reference is made to such earlier workers as George M. Dawson, A. R. C. Selwyn, R. G. McConnell, J. Richardson who "laid with skill the broad and secure foundations upon which all subsequent work must be built. Dawson's work," it is stated, "was of an exceptional character, and will always remain the basis for future work in almost every part of the Canadian Cordillera."

In discussing the maps of the first period it is said that they may be divided into three types. The most primitive was made by traversing the great inland water routes of the interior and either mapping the geological formations encountered or merely sketching in the topography and describing the geology. "In this way Selwyn examined some of the proposed routes of the Canadian Pacific Railway in 1871 and 1875, which included parts of the Fraser, Chilliacoo, Pine and Peace Rivers; Dawson examined the Yukon, Stikine, Skeena and Peace; and McConnell, the Yukon, Liard, Porcupine, Omineca and Finlay Rivers." A second type of map covered large areas from 6,000 to 3,000 square miles in extent on a scale of from 4 to 8 miles to the inch, and the work, involving a great deal of topographic surveying as well as geological mapping, usually was completed in one or two seasons and so necessarily was somewhat sketchy. Then there was a third type, a detailed map on a scale of 4 miles to the inch, embracing a small area in one or other of the coal bearing districts.

Greater Accuracy and Detail.

R. G. McConnell, R. W. Brock, O. E. LeRoy, Charles Camsell and others are mentioned as having ushered in the second period. Brock and McConnell's West Kootenay Sheet was the first map in which the change occurred. It was a four mile map embracing over 6,000 square miles and distingnished by its greater accuracy and detail, the result of more complete traversing, and the application of petrography, which differentiated a number of types of igneous rocks.

"After this" Dr. Dolmage proceeds "came a more distinct change in the class of work undertaken, in the methods employed and, consequently in the results obtained. All of the workers above mentioned devoted themselves to the close detailed study of mineral deposits and their immediate vicinity, and after 1907, it became for a time the policy of the Survey to do this class of work. There resulted a great number of small maps covering a few hundred square miles at most, on scales ranging from a fraction of a mile to two miles to the inch. These were executed in great detail, and, though a topographic division had not yet been estab-

lished in the Geological Survey, accurate contour maps were used for most of this work."

Examples of this type of work are given which, it is stated, was followed by a phase during which, though economic geology still took a prominent part, other branches of the science such as physiography, structural geology, stratigraphy and petrology received much attention. The latter began with Daly's work on the Forty Ninth Parallel. Of this it is asserted that "the undertaking was a large one, the time was limited, adequate topographic base maps were not always available, no geographically trained assistant was employed and the work was confined to a narrow strip along a straight line where outcrops were sometimes scarce and fossiliferous exposures still more rare. These conditions necessitated hasty work with insufficient traverses and, as Daly himself says, the quality of the work lies half way between reconnaissance survey and detailed survey. As a natural result the maps now published on the mile-to-the-inch contour maps of the Boundary Commission do not possess the accuracy they would suggest and already subsequent workers have had to make some important changes in the structure and stratigraphy."

The organization of the Topographic Division of the Geological Survey at about this time, and the excellent contour maps it produced, had a decidedly favourable influence on the geological mapping done. Instances are given of much 4 to 6 mile work, partly of a reconnaissance nature and partly of a more detailed nature. Illustrations also are cited of "two-mile" maps, somewhat more refined and it is said that a great deal of work has been done recently on a scale of one mile to the inch and less, all of which has been done in great detail and with considerable accuracy "although not necessarily directly related to mineralized areas."

The period as a whole is characterized as one in which all phases of geology receive about equal attention. The policy in effect since 1918 is to confine the work to areas of known economic importance or to areas at present within easy reach of transportation. Accordingly Mr. Schofield has mapped the Britannia Mineral Belt lying between Howe Sound and Burrard Inlet. J. J. O'Neill began and George Hansen is completing an area in the Salmon River District of Northern British Columbia. W. E. Cockfield has just published a sheet on a scale of four miles embracing Sixty Mile and Ladue Rivers in the Yukon District and is at present engaged in mapping in the vicinity of Mayo Lake. W. A Johnson has just completed a detailed investigation of the Fraser Delta. Dr. Dolmage himself has completed a shoreline map of the west coast of Vancouver Island from Barklay Sound to Cape Scott which was executed on a scale of one mile to the inch. In 1917 Charles Camsell, now Deputy Minister of Mines at Ottawa, made a geological map of a section along the Pacific Great Eastern Railway from Squamish to Lillooet. B. R. Mackay began and W. A. Johnson will continue a detailed map of superficial geology in the Cariboo gold placer belt in central British Columbia. C. E. Cairnes is completing a map of an area along the Coquihalla River which was begun by Mr. Camsell in 1919. M. F. Bancroft is engaged in mapping a large area in the Slocan District southeast of Revelstoke. J. R. Marshall is continuing the detailed mapping in the Elk River District, eastern B.C., which was previously was carried on by Bruce Rose.

It will be quite clear that the Geological Survey is doing an invaluable work in this Province and that already its records, which are available to those connected with the mining business in the West, are sufficiently extensive to be used more commonly than perhaps is now the case for purposes of reference. The policy recently adopted and in effect means thorough, accurate, and authoritative scientific knowledge of mineralized zones will be obtained when and as such zones are discovered, that the geologist and the topographer will follow in the footsteps of the prospector and that generally the more remote sections of the Province will be subjected to the more refined investigation and mapping as transportation makes their resources more readily available for developments.

INCREASED BUYING POWER OF GOLD.

British producers of gold have had, in the past two years, the advantage of obtaining, in addition to the fixed currency of 84s 11½ per fine ounce, the premium of the American Exchange. This premium reached 42s 4d per ounce, or 50 per cent, last year at about the same time that commodity prices attained high water mark. Since that time commodity prices (wholesale) as ganged by the "Economist's" Index Number, have fallen about 41 per cent, while the sum of the fixed currency price for gold, plus the exchange premium, has declined 19 per cent. (May 18, 1921.). On balance, therefore, the buying power of British gold had risen about 36 per cent. While the price of labor has not, as yet, declined appreciably, there is no doubt that a world-wide reduction of wages has commenced and this movement is likely to become accentuated by the general trade and industrial depression.

In the gold producing countries the circumstances may vary in detail, but the principles are the same.

How seriously the world's production of gold has declined since 1914, notwithstanding the remarkably steady maintenance of output by the Transvaal mines (due largely to the employment of unskilled black labor), is shown by the following figures compiled by the Transvaal Chamber of Mines:

	World output £	Transvaal p. c.
1914	92,854,000	38.3
1915	97,700,000	39.5
1916	95,700,000	41.3
1917	87,040,000	44.0
1918	77,528,000	46.0
1919	73,000,000	48.5

COMMERCE COURSES FOR GRADUATE ENGINEERS.

The demand for engineers with business training has led the Faculty of Applied Science of Queen's University, in co-operation with the Departments of Economics and of Commerce and administration in the Faculty of Arts, to establish a special course of a year's work in commerce for engineering graduates of Canadian universities. The new course will be open to engineering graduates of any Canadian university. The Subjects to be studied will include general economics, business finance and business law, economic geography, the financial organization of society, marketing, accounting, problems of labor, industrial management, business statistics, and business policy.

Among those who will deliver lectures is E. W. Beatty, President of the Canadian Pacific Railway and Chancellor of Queen's.

The New Coal Raising and Screening Arrangements at Jubilee Colliery, Sydney Mines N. S.

By Albert Dawes.[2]

JUBILEE colliery has two shafts, one of which is used for the hoisting of men, the other for the hoisting of coal. The former, locally known as Jubilee "A," was sunk some years ago, to tap two seams of coal approximately 560 ft. and 740 ft. below the surface. The latter, known as Jubilee "B", was sunk between 1914 and 1916. A description of the shaft sinking, by Mr. R. Robertson, is to be found in the Proceedings of this Society for 1917.

There is installed at the "A" shaft a large ventilating fan, and a hoisting engine, both electric driven. Fan ducts and housings are of concrete, and the hoisting engine and fan motor are contained in a substantial concrete building, while a steel headframe surmounts the shaft.

By way of contrast, the surface plant erected at the "B" shaft consisted on its completion, of a wooden headframe and bankhead building, with tipple, screen, and picking belts, taken from the discard of the various collieries, some boilers, second-hand hoisting engines, an antiquated box car loader, and a few shacks scattered at random here and there as shelters for other various equipment required for operating a colliery—all of which was not at all in keeping with the equipment at "A," or commensurate with the importance of the shaft "sinking" then just completed. But all this was put together to serve until such time as the coal mined from the colliery would warrant a larger monetary outlay on better equipment.

The increasing development of the mine underground made necessary the purchase in 1918, of a 3,000 cu. ft. electric driven air compressor, which was erected and housed in a temporary building and placed in such a position that the coal hoisting engine house of the future would contain it as well. This machine is the only redeeming feature of the surface equipment at the coal shaft of this colliery.

The coal output has steadily increased, until it now averages 700 tons per day, and the bankhead, hoisting facilities, and mechanical equipment, are all being severely taxed in taking care of this amount of coal. Every part requires constant attention and continual repairs to keep it in running condition; the number of men employed on all the various operations involved in handling the coal, from the pit bank to railroad cars, is very high; and the all round mechanical efficiency is extremely low—these factors have all added their quota in making the cost of producing coal what it is at the present time.

The question of providing a new bankhead with good coal hoisting facilities was taken up early last year, as the inadequacy of the existing equipment was beginning to be then seriously felt; and when, later, large contracts for coal from this colliery were secured, which it would be impossible to take care of unless additional equipment were installed, the Company authorized the monetary outlay necessary for this purpose.

The new surface equipment, which is now under construction, includes two electric driven hoisting engines (one for each seam) housed in a substantial building; a structural steel pit headframe 90 ft. high; a steel and concrete bankhead, consisting of connecting bridges; an auxiliary tipple building; and a main tipple screen and picking belt building equipped with the necessary machines, electric motors, and other appliances which make up a surface equipment of this nature. It also involves the construction of a railway assembling and distributing yard, a blacksmith and tub-repair shop, a warehouse, and an office.

In the consideration of the general scheme, the size of winding engines, of all machinery, and of structures, had to be based, not only on immediate prospects, but on future possibilities, and for this purpose the future maximum output of the colliery was taken as 2,000 tons per day, or 1,000 tons from each seam. The attainment of this output, either from a mine development or a market standpoint, is probably a matter of a few years, whereas a maximum up to 1,000 tons per day is being looked forward to in the near future. The hoisting engines and house, the pit headframe, and other parts had therefore to be arranged, and equipment made of sufficient size, for the larger output; but, in order to cut down initial cost, only half of the eventual main tipple, screen, and picking belt building, and half of the eventual equipment, is now being constructed. The arrangements, however, are such that duplication of the present half can be readily accomplished when required.

The hoisting facilities, as well as the bankhead, have been designed and laid out in such a way as to provide, as far as possible, the best of equipment for handling the coal from the pit bottom to bank, as well as for its classification and cleaning, and, of special importance, its loading as desired into either hopper or box cars. Provision has also been made for the mechanical loading of slack coal into box cars; for readily bunkering the Company's locomotives; for supplying coal from bins for local purposes; and for the disposal of "stone" or "material other than coal" from the mine and the picking belts.

It will be apparent, therefore, that the new hoisting, screening, cleaning, and loading, plant when completed, will probably have cost more money than is usually expended on similar equipment for the same capacity; and emphasis is laid on this, inasmuchas the larger monetary outlay necessitated by the adoption of these special features might be criticized. But, in order to be prepared to sell all the coal produced from this colliery, whether screened, run of mine, or slack, and to dispose of it readily, either into box cars or hopper cars, it was incumbent to provide facilities as flexible as possible now, so as to be in readiness for the time when they might become indispensable.

The work now under construction involves an estimated expenditure of $385,000. Excavations for foundations commenced in October last, and it was expected that the bankhead would be completed by April; but,

[1] Presented at the Annual Meeting of the Mining Society of Nova Scotia, Halifax April 1921, and reprinted from C. M. & M. I. Bulletin for July.

[2] Divisional Engineer of the Nova Scotia Steel and Coal Company.

owing to various causes, such as promised deliveries not being fulfilled, it now seems probable that the work will not be finished before July. The work is being carried on while the present bankhead is operating, and it is hoped that no stoppage of colliery or reduction of coal output will ensue while construction is proceeding. The change from old to new equipment will be arranged for at a week-end.

When in operation, the new equipment will allow of the number of men now employed being reduced by 20, the expensive upkeep of an old equipment will be eliminated, and the operating power cost will be considerably reduced. The present cost for labour, repairs, supplies, and power, in handling the coal from pit bottom to coal cars, should be reduced 25 per cent, which is equal to an estimated saving of $36,000 per year.

Furthermore, as the number of men required for operating the new bankhead for an output up to 1,000 tons will not be more than for 700 tons, and as the electric power charge for operating at the greater output will obviously not increase proportionately, the cost per ton of coal for an output of 1,000 tons per day should be 35 per cent less than the present cost of handling the coal from the pit bottom to the coal cars.

In order that this saving, or reduction in cost, shall become a reality, it is essential that every mine official conscientiously strive to carry out the intentions of those responsible for the new equipment, and especially to see that, where labour can be displaced, that labour shall stand displaced, and not be merely transferred to some other place, except it be the working face.

The undertaking can be classed under three heads, namely:

The Coal Hoisting Equipment and Building.

The Structural Steel Pit Head Frame.

The Bankhead, which includes the bank around the headframe, the connecting bridges, auxiliary tipple building, and main tipple, screen and picking belt building, and the equipment contained therein.

The Coal Hoisting Equipment.

The coal hoisting equipment consists of two single geared hoists, built by the Vulcan Iron Works, Wilkesbarre, and each designed to raise 1,000 tons of coal per day from the respective seams. These hoists are duplicates with the exception of the size of motors and gear ratios, and that one is arranged right-hand and the other left-hand. They are each driven by Westinghouse A. C. motors of the wound rotor type, built for hoist service, and working from a 2,200 volt, 3 phase, 60 cycle, electric power supply. The motors are respectively 550 H.P. and 350 H.P. for lower and upper seams. The gears are machine cut, herring-bone type, and, working in an oil bath, will be practically noiseless. The drums are cylindro-conical, having a small diameter of 7 ft. and a large diameter of 10 ft.

Besides a powerful main brake of the post type, there is also provided on each hoist an auxiliary band brake which operates on the motor pinion shaft, its function being to absorb the inertia of the rotating parts of the motor, and relieve the gears of unnecessary strains. The two breaks are so inter-connected that, when the main brake is applied, the one on the pinion shaft also comes into action. The latter is also arranged so that it can be applied independently.

The air pressure contained in the cylinder of an auxiliary air engine holds the brake in the off-position, and on being released, applies the braking force through the medium of weights. This force is proportional to the air pressure exhausted from the air cylinder.

The auxiliary engine is also provided with a device which automatically applies the brake in case of power failure, overspeed, or overwind.

The speed of the hoist motor is controlled by varying the resistance in the rotor circuit, this being accomplished by the operation of a small master controller, mounted on the hoist platform. The master controller actuates through magnetic contractors, which are governed by suitable current limit relays. Automatic acceleration which is, to a certain extent, independent of the operator, is thus provided for.

The safety features of these machines are such that: the hoists cannot start in the wrong direction, or overtravel in either direction; the brake will not be suddenly applied on power failure, but it will allow of a full application of brake if required, when limits of travel are reached; the brake cannot fail due to worn brake shoes, or the failure of air supply to the auxiliary engine, or grounded control circuits, and the hoisting or lowering of men can be done at reduced speed; as there are very few levers, an inexperienced operator cannot injure the hoist by improper manipulation of levers, neither is it necessary for him to call for assistance or leave his station to reset the safety devices. These features tend to give the operator complete confidence in the hoist under his control, and at the same time they afford the maximum of safety to the men and apparatus—in this respect more than fulfilling the requirements of any mine law enacted concerning such equipment.

The brick building in which this apparatus is being installed is 97 ft. 6 in. long and 39 ft. 0 in. wide. It has been made sufficiently large to accommodate the present 3,000 cu. ft. electric motor driven air compressor, and also a future one of the same size. The building is of substantial construction, is well lighted, of not unpleasing appearance, and, considering that the whole construction was carried out in winter, is very satisfactory. An overhead travelling crane is being built for erection purposes, and for the handling of heavy parts of machinery, when such might be necessary.

The Structural Steel Headframe.

The structural steel headframe consists essentially of six built-up plate and angle columns, the tops of which support a platform on which are mounted the four head pulleys. The columns are so placed about the mouth of the shaft as to form, with their framing and connecting bracings, what are virtually continuations of the upper and lower seam shaft compartments, in which the coal cages are guided and hoisted to the banking floor.

In the design of pit headframes, the main difficulty is not to determine the strength of columns, struts, and stays, for resisting the bending compression and tensile stresses, but to obtain the necessary stiffness and rigidity, and stability, of the whole structure with the least weight of material to withstand heavy loads suddenly applied and as suddenly taken off; all of which factors are affected by the loads, the acceleration, and the height of the structure.

It is the common practice in pit headframes to have back "stays" to resist the tension of the ropes from drum to head sheave, but in the headframe under construction at the Jubilee colliery there are, instead

front stays, the lower portions of which are anchored to solid concrete foundations, and serve as building columns of the bankhead structure. Hence the weight of that part of the bank structure helps to reduce to some extent the amount of concrete in the anchorage necessary for stability.

This departure from type was made in order to give an uninterrupted passage-way for the empty tubs returning to the bank, and also to avoid complications due to one of the present steam driven hoisting engines obstructing the best position for the feet of back stays. This construction made possible a reduction in the total height of the headframe, and, as tension members are obviously lighter in construction than compression members, it also permitted of a considerable reduction in weight, and hence in cost, of the steelwork.

A system of beams is arranged for supporting the "safety detaching hooks" against overwind. Another set of beams is provided for the chairs or keps supporting the cages at the banking floor, and there will be a substantial stairway leading from the banking floor to the top platform supporting the head pulleys.

As the new headframe is being constructed around the present timber headframe and bankhead, its erection will be attended with difficulties. To facilitate erection, each of the columns is being made in sections.

The total height of the headframe from surface to centreline of head pulleys is 90 ft., and the estimated weight of steelwork, including front stays, is 110 tons.

The Bankhead.

On being hoisted to the banking floor, which is 40 ft. above the ground, the two full coal tubs contained in the cage run by gravity along the connecting bridge and through the "auxiliary tipple building" to the "main tipple house." The coal is there dumped by means of an automatic power driven revolving tipple into two weigh tanks situated below the floor. The empty tubs then continue the down grade into a dip, where a creeper hauls them up a grade sufficiently high to allow of their returning by gravity to the bank, thus making a complete circuit.

The weigh tanks into which the coal is dumped are each equipped with gates operated by air cylinders. After being weighed, the coal is fed on to a horizontal reciprocating conveyor type screen. This screen is supported on rollers and receives a "slow" forward, and "quick" return motion, by means of special driving gear.

The screen is built with three decks, the screen plates of the upper being perforated with holes of sufficient size to allow nuts and slack coal to fall through the middle deck, and this, having plates likewise perforated but with smaller size holes, allows the slack coal to fall through to the lower deck. The coal is thus classified into "screened" on the upper, "nuts" on the middle, and "slack coal" on the bottom deck. The screen is arranged with the usual dead plates for run of mine coal, and with suitable gates through which slack and nut coal may be diverted on to conveying belts or into chutes, as desired, thus giving flexibility in the disposal of products.

At the outer end of the screen, a breeches chute diverts the run of mine or screened coal on to two picking belts equipped with the usual swinging jibs, and so arranged that when in the "up" position they discharge the coal into a feeding bin for eventual loading into box cars by means of a mechanical loader, and when "down," into hopper cars.

The slack coal for loading into box cars, for which a mechanical loader is provided, is conveyed from under the screen on a rubber belt to a feeding bin, the arrangement being such that hopper cars can be loaded when required.

As a market for nut coal is more or less a matter for the future, the conveying belt provided for this purpose will, for the present, serve for conveying small size lump, nut, or slack, coal into a large bin located under the auxiliary tipple floor from whence it can be taken for locomotive bunkering, or for domestic and local use.

The revolving tipple located in the auxiliary tipple building is primarily for the disposal of stone from the mine, and which comes up the shaft in coal tubs. The stone will be dumped into a special stone bin under the floor, from whence it will be discharged into hopper cars for removal to the colliery dump. This tipple will also be used as an auxiliary for coal, for, by means of a suitable gate in the tipple chute, coal may be diverted into the above mentioned large coal bin located under the floor.

The stone taken from the picking belts is to be delivered by means of a bucket type conveyor into the stone bin under the auxiliary tipple floor. With the exception of the picking belts, which will both be driven by one motor, all parts of the mechanical equipment are to have their own driving motors. These are 25 H.P. for the propulsion mechanism of the screen, 25 H.P. for the two picking belts, and 5 H.P. for each conveyor. The countershafting is being arranged so that when the future half of the equipment is added, the picking belts and screen of the new half may be driven by the motor of the other.

For the mechanical loading of coal into box cars two conveyor belt loaders have been purchased from the Ottumwa Box Car Loader Company. These loaders are practically identical except that the one for loading run of mine or screened coal is equipped with a steel conveying belt, whereas the other, for slack coal, is being furnished with a rubber belt. These two machines will each be operated by 25 H.P. alternating current slip ring type motors. All operations of these machines are entirely mechanical. They will permit of the loading of the coal near the centre of the car, or out towards the extreme ends, and, by being able to load close to the floor or high up in the car, coal may be placed in any desired position in the cars. All the motions are power operated, only one man, the operator, being necessary for loading the cars. They are each guaranteed to load at the rate of 150 long tons per hour.

The structural steelwork of the bankhead is being fabricated by the Canadian Bridge Company. All columns of plate and angle section are supported on substantial concrete foundations. The floor system is composed of I-beams, or channels. The trusses, purlins, bracing, and girts are of angles, no thickness of metal being less than 5-16-in. The total weight of steelwork will be approximately 350 tons.

The floors are to be of reinforced concrete, minimum thickness, 4 inches. Triangular mesh reinforcement is being used. That portion of the floor under the driving mechanism of the screen will be about 14 inches thick, in order to present a solid mass against the inertia of the reciprocating parts of the screen.

The buildings are being covered on roofs and sides by 20 and 22 gauge galvanized corrugated sheeting.

and are being furnished with plenty of windows. The latter are generally made to slide back so as to give a full, or part, window opening as desired. In addition, over those portions of the buildings where coal dust is mostly encountered, that is, over the main tipple and the picking belts, Robertson Patent Roof Ventilators will be fixed, so that good ventilation is anticipated during the summer weather.

As the bankhead is built entirely of steel and concrete, and is therefore fireproof, no insurance on either buildings or equipment will be needed. This means a considerable amount saved in yearly premiums, and at the same time it insures against that loss in output which invariably results when a fire occurs on a bankhead constructed of wood.

It goes without saying that colliery bankheads are not usually picturesque, but they can be made so as not to be unsightly. Ruskin asserted that man has no more right to disfigure landscapes with ugly buildings than he has to putrify the atmosphere with obnoxious smells. Bearing this in mind, and that Jubilee colliery is situated in the middle of the town of Sydney Mines, it has been the aim to erect an equipment which will be the equal of the best of its kind, and not unsightly; such an equipment as both the town and the company may be, with reason, just a little proud.

SUDBURY NOTES.

By D. E. CUSHING.

Sudbury.—While many mining men have ignored the Goudreau area, believing that the paystreaks are narrow and patchy, although it cannot be said that sufficient work has been done to show how the viens are at depth, there is considerable more staking going on there than most realize. An area extending for two miles wide and for six miles east and west, with the Murphy claims as the centre, has practically all been taken up, while in the vicinity of the McCarthy-Webb claims considerable staking has also been done.

Practically all the area wherein the staking is taking place, is owned by the Algoma Central Railway. C. H. E. Rounthwaite of the Lands Department of the railway recently visited the area, he reports that most of the holders of claims are working them to the limit.

Probably the most satisfactory results have been achieved on the Murphy claims where at 14 feet, a good grade of ore was found to continue, although nothing startling has been accomplished. The Keeley claim, a find reported some weeks ago, has not lived up to the first claims made for it, in that very little free gold has been found. Keely is hard at work however and may produce results yet.

The A. C. R. man stated that there is no great rush to the district. He says that some free holders of claims are not working them and are holding them for a boom or rush.

However the outlook for a boom is remote. Money is too tight for anyone to go into a district that has not been worked and shows no result, when there are so many excellent properties in other camps open for purchase.

The Silver Islet Exploration is meeting with encouraging results. The long drift, being run on the fourth level to cut the dyke which contained the excellent silver values when the property was worked years ago, is now in close to 400 feet. The first favorable sign which was encountered was a calcite stringer carrying pyrites. Later a stringer carrying galona, zincblende and pyrites followed and the work has just passed a number of six inch calcite stringers, all containing the above minerals with the addition of silver, the first to be encountered. The chief encouragement however, is not the amount of silver contained in these stringers, but the fact that the whole area cut through is well mineralized. Records of the old work also show that it was just in such a formation in the old workings that the high silver values were met with.

All in all, those in charge of the work are daily becoming convinced that their hopes are soon to be realized. The drift is to be continued for at least 1,200 feet.

The shaft at Edward's Island, nine miles east of the silver Islet is now in massive arsenical silver at a depth of over fifty feet, this having continued from surface. The work is also being done by the Silver Islet Exploration and it will continue sinking for some time before lateral work is undertaken.

The International Nickel Corporation has followed the lead of the British American and Steel Co's. shop. The result is that in a very short time Copper Cliff and Creighton like Nickelton, will be almost abandoned. Only the Mond Nickel remains in the operating field.

It is not surprising that the International has closed. It was piling up a tremendous stock of raw material, the overhead charges of which might easily eat up a good portion of the profit in a low priced market which, it would seem, will obtain for the next couple of years. At Copper Cliff, Port Colbourne and at its big refinery in the States, the International has a heavy stock in the various stages of treatment. At Copper Cliff the one oven operating could not handle or keep pace with the underground production with the result that besides the make on hand there is also a large tonnage of broken ore on surface awaiting treatment.

The outlook for the International however, is brighter than for the others, inasmuch that the Corporation expects to have its new steel plant going in the U. S. by next spring, and its demand on the product of the mine will, it is said the officials believe, mean that the mine will be obliged to resume in about three months after.

Over 400 hands were laid off when the plant shut down.

NEW CRAWLING TRACTOR CRANE.

In our issue of the 26th, of last month, an error inadvertently crept into a paragraph relative to the new crawling tractor crane which Industrial Works, of Bay City, Michigan, have added to the crane family for which they are noted. The paragraph in question stated that the type BC had a capacity of 2,000 lbs., at 12 ft. radius. This is an error which we have no doubt was obvious to many of our readers. The type in question has a capacity not of 2,000, but of 20,000 lbs. at 12 ft. radius, equipped with continuous crawling tractor belts, while the other type—type BT—in which the crane is built, has a capacity of 18,000 lbs. at 10 ft. radius equipped with four broad gauge tractor wheels.

This new crawling tractor crane has been developed to meet the need for a full-revolving tractor crane which can be operated independently of rails.

LAKE SHORE.

Lake Shore treated 1,967 tons or in July yielding $49,155, an average of $24.99 per ton.

BLACK LAKE ASBESTOS.

Further information concerning the affairs of the Black Lake Asbestos & Chrome Co. has been made public by the President, J. A. Jacobs, who explains that sales have fallen off seriously of late. There is, nevertheless, still a good surplus of liquid capital. Mr. Jacob's letter is as follows:—

"At the meeting of directors of the above named company, held August 11, reports on the company's operations and financial statement for six months ending June 30, 1921, were submitted and approved. After careful consideration it was decided not to pay the interest coupons on the income bonds due Sept. 1, 1921, as the company had not earned same.

"Since the new Board of Directors was elected last March, a general business depression occurred which was unexpected. The sales of the company's product was less than 40 per cent of the previous six months, although the production at the mine has greatly increased, and it therefore required considerable financing to keep the mine operating.

"Extensive repairs, alterations and extensions have been made to the mine buildings and plant, and a sum amounting to over $52,000 has been spent to date. An additional amount of about $13,000 has been expended on new developments with satisfactory results.

"The mine is now being operated at a considerable saving in costs, and we have every reason to believe that as soon as business improves the earnings will be more than sufficient to take care of the income bond interest.

"The company's financial position is as follows:

Quick assets	$363,186.23
Current liabilities	91,372.60
Surplus	$271,813.65

Some description of the mining methods at Black Lake is given by Mr. W. D. Hubbard in an article on the Black Lake Asbestos area, written for the Engineering and Mining Journal. Mr. Hubbard writes in part: "Mine and mill are situated near the top of a serpentine ridge about 400 ft. higher than the railroad. A dirt road about a mile long serves for transportation. Pits are sunk in the side of the hill. The largest of these, No. 9, is about 150 ft. deep by 500 ft. long and 200 ft. wide. The entrance is 300 yds. from the mill hoppers.

"The mill itself stands on a level about sixty feet below the bottoms of the deepest pits. It is rated at 850 tons' daily capacity and is supplied from bins built below the tracks leading from the various pits. The primary bin will hold about 350 tons. A machine shop stands above and to the west of the mill, the tracks from the pits leading directly into it. Practically all the local repair work of the mine is performed in it.

"Operations in the pit are about as follows: The rock is drilled by tripod drills, holes averaging about twelve feet deep. These holes are spaced about eight feet apart and twelve feet from the wall, breaking the rock in benches. Large chunks too small to be hoisted separately are blockholed with plugger drills. None of the drills require water, as the rock is comparatively soft. Broken rock is hoisted by nine cable derricks, the reason for this large number of hoists being that, although a cable derrick is almost unlimited in longitudinal reach, it is decidedly limited laterally. Hence to cover the whole pit efficiently many derricks are used. Each derrick has a separate electrical hoist, which means that there are nine hoistmen. These hoists are situated back from the edge of the pit, and consequently the hoistman cannot see when to raise and lower his boxes. This necessitates having men stationed at the pit edge to signal the hoistmen. One signaler is sufficient for two derricks and one man dumps the boxes from two derricks. Three to four men are employed shovelling rock into the boxes. Three boxes are used with each derrick, enabling each hoistman to complete between ninety and one hundred loaded trips per ten-hour day. The boxes hold a ton and a half, and three of them fill a car.

"As the cable derricks cannot cover the whole pit without an almost impossible network of cables, a steam crane is used to pick up boxes in places outside of the cables' reach. This crane runs on a track about twelve inches wider gage than the ore trains, which necessitates an extra rail coming into the pit. It also limits the usefulness of the crane, because the new track has constantly to be laid.

"It can be seen from the above that the minimum number of men working in the pit under normal conditions would be distributed as follows: Number of hoistmen, 9; number of signalers, 4; number of dumpers, 4; number of loaders (3 to each derrick) 27, a total of 44, not including trip-riders, cranemen, bosses or engineers.

"The hoist motors for each derrick are electric and are rated at fifty horsepower. The horsepower of the crane is not known, but it must be at least seventy-five. This gives a total of 525 hp. It would seem that two electric shovels could reduce costs and speed up operations to a marked degree."

COAL MINING EQUIPMENT NOW MADE IN CANADA.

The Canadian Austen Machinery, Limited, of Woodstock, Ontario, in addition to manufacturing in Canada the complete Austen line of earth-moving and concrete-mixing equipment, also announce the addition of the Fairmont Mining Machinery Line, which is the most complete organization in America devoted to the manufacture of coal mining equipment exclusively. It is a particularly opportune time, in view of the development of the Canadian Coal Mining Industry, that the various companies operating throughout Western and Eastern Canada can secure from a Canadian manufacturer such a full line of equipment necessary to their requirements.

Among the lines manufactured are Steel Mine Ties, Portable Gallery Pumps, Railroad Box Retarders, Box Car Loaders, Power Coal Augers, Mine Cars, Steel or Wood Mine Car Trucks, and the well-known Fairmont Tipple Equipment.

LICENSING OF MINING ENGINEERS.

An endeavor to secure expressions of opinion on "Licensing of Engineers" has been made by a committee of the A. I. M. M. with the result that only five were found who are unconditionally in favor of the licensing system. Only 128 letters were received in response to the request for opinions and of these 81 are unconditionally opposed. Twelve would favor uniform state laws with reciprocity or general Federal law. Four would accept licensing as a matter of expediency and would join in attempting to steer legislation. The committee would recommend that independent action be not taken, but that the society co-operate with others to oppose licensing legislation.

A VISIT TO ANYOX.

Mr. Geo. Mackenzie, secretary of the Canadian Institute of Mining and Metallurgy, describes in the August bulletin of the Institute his recent visit to the Granby copper mine and smelter at Anyox. He says in part: "Arriving in Anyox, I was greeted by a fair day and also by Mr. E. J. Conway, Chairman, and Mr. H. M. Roscoe, Secretary of the North Coast Branch. Mr. Roscoe then took me for a tour of inspection through the smelter and power plants, and from there we proceeded to the Hidden Creek mines, where I was shown the shrinkage method of working large ore bodies on a grand scale. It is beyond me to attempt a description of the Hidden Creek mine in these short notes. I will merely say that to anyone interested in the cheap mining of large ore deposits the methods pursued at Anyox are inspiring and instructive. During the month of May some eighty-eight thousand tons of ore were delivered to the smelter and while it is improbable that this will be equalled in June, an inspection of the mine gives one the impression that if pushed for production the mining staff are in a position to smother the smelter with ore on comparatively short notice. One of the large stopes I was in was simply awe inspiring. The great width and length of this opening, containing not a stick of timber, gives one the impression that a glory hole has been turned upside down; and then, when one climbs through where an old stope has been opened to the surface, one gets an idea of the size of the ore body that has been extracted. The smelter is supplied with coke from a by-product plant situated in the town of Anyox, and the coke is made from a mixture of 85 per cent Cassidy and 15 per cent Alberta coal. The by-products, consisting of ammonium sulphate, tar, and benzol (the latter excellent for motor fuel), are produced in considerable quantities. The by-product ovens are of the American type, and the whole plant is a model of excellent design, and is operated with a minimum of trouble. On the evening of June 9th, a meeting was held in the Community Building, where I gave a short talk concerning Institute matters, and presented eight or nine lantern slides descriptive of the interior economy of the Institute. On Friday, the 10th, I prowled about the mine and coke ovens in company with Mr. Roscoe, who generously gave me a great deal of his time in order that I might not miss anything of interest. After a most enjoyable evening, with the Elks, I was lifted bag and baggage and transferred by Mr. J. A. Bancroft to his private residence, where I was most graciously entertained by Mrs. Bancroft and her lesser half. Buster Bancroft is right into the smelting copper business up to his neck, and roams around Anyox from one end to the other—goodness knows how many times a day—all dressed up in his khaki working clothes from seven o'clock in the morning until five o'clock at night; and what's more he appears to like it. I really believe he does like it, because he is always smiling, and I would like to bet that if any copper ore at Hidden Creek evades being smelted it won't be Buster's fault. I met Mr. H. S. Munro, the General Manager, for a few minutes only, on Thursday, as he was leaving on the same boat that brought me in. He, however, assured me that I could roam to my heart's content, and that I was in capable hands with Messrs. Bancroft and Roscoe.

TORONTO MINING QUOTATIONS.

Quotations on Active Stocks on Standard Stock Exchange on September 6th, 1921.

Silver	High	Low	Last
Adanac Silver Mines, Ltd.	2	2	2
Bailey	2⅛	2	2
Beaver Consolidated	27½	26	27
Chambers-Ferland	5	4	4
Hargraves	1¾	1¾	1¾
La Rose	25½	20	25½
Mining Corp. of Can.	1.05	1.05	1.05
Peterson Lake	5	4¾	4¾
Temiskaming	28	25	25
Trethewey	12	10½	10½
Gold			
Atlas	15	14½	15
Boston Creek Mines	6	6	6
Dome Extension	65	65	65
Dome Lake	9	9	9
Dome Mines	19.00	18.40	18.40
Gold Reef	2½	2½	2½
Hollinger Cons.	7.36	7.20	7.35
Hunton Kirkland G. M.	6½	5	5
Keora	7½	7	7
Kirkland Lake	41	37	39
Lake Shore M. Ltd.	1.28	1.22	1.27
McIntyre	2.05	1.98	2.02
Moneta	11	11	11
Newray Mines, Ltd.	5	5	5
Porcupine Crown	16½	14	16½
Porcupine V. N. T.	19	17	18
Schumacher	23½	22	23½
Teck-Hughes	17½	16¼	16¾
Thompson Krist	4	4	4
West Dome	8¾	8⅛	8¼
Wasapika Gold M. Ltd.	4½	3	3¼
Miscellaneous			
Petrol Oil	25	20	20
Vacuum G.	4⅝	4⅝	4⅝

SAWARD'S ANNUAL.

This standard statistical review of the coal trade has appeared for 1921, and continues publication of an annual that is considered a necessary desk companion of all those interested in the coal trade in North America. Price is $2.50 per copy, bound in red cloth, and obtainable from the compiler, F. W. Saward, at 15 Park Row, New York.

METAL QUOTATIONS.

Following are the fair average prices for ingot metals (in less than car-loads):

Toronto.	Cents per lb. Aug. 31st	Sept. 7th
Copper, Electric	17	17
Copper, Casting	16¾	16¾
Tin	35	35
Lead	6¾	6¾
Zinc	7¼	7½
Aluminum	27	27
Antimony	9	9

Montreal.	Cents per lb. Aug. 31.	Sept. 7.
Copper, electric	17	17
Copper, casting	16¾	16¾
Tin	33½	33½
Lead	6¼	6½
Zinc	7	7
Aluminum	28	28
Antimony	7	7

TORONTO COAL PRICES.

Toronto, 7th Sept. — Coal prices remain absolutely unchanged. So far as lump coal is concerned there is a little more tonnage being placed, and the situation gives indications of further improvement. Slack is still rather scarce. The demand for anthracite is on the upgrade, so far as Toronto is concerned, but is still not of the magnitude that it should be at this season of the year, and this latter remark is applicable, with greater emphasis, to other points in the Province.

PERSONALS.

Mr. Bernard Cripps of the engineering staff of the Hollinger had his foot badly mangled when he jumped from a moving train near Aurora. It was necessary to amputate all the toes on one foot.

A party of American geologists from Michigan is visiting the Sudbury and Cobalt districts this week.

HUDSON BAY.

The mill at the Hudson Bay silver mine is again in operation, treating about sixty tons a day.

The Canadian Miners' Buying Directory.

Acetylene Gas:
Canada Carbide Company, Ltd
Prest-O-Lite Co. of Canada, Ltd

Acetylene Welding:
The Toronto Iron Works, Ltd.

A.C. Units:
Powley & Townsley, Limited.

Agitators:
The Dorr Co
Can. Chicago Bridge & Iron Co., Ltd.
Horton Steel Works, Limited.

Air Compressors:
Belliss & Morcom, Ltd.
Laurie & Lamb

Air Hoists:
Canadian Ingersoll-Rand Co., Ltd
Mussens, Limited.

Air Receivers:
The Toronto Iron Works, Ltd.

Alloy and Carbon Tool Steel:
Peacock Brothers Limited.

Alternators:
MacGovern & Co.

Aluminium:
Spielman Agencies, Itegd

Amalgamators:
Northern Canada Supply Co.
Mine and Smelter Supply Co
Wabi Iron Works.

Antimony:
Canada Metal Co.

Antimonial Lead:
Pennsylvania Smelting Co.

Assayers' and Chemists' Supplies:
Dominion Engineering & Inspection Co
Lymans, Limited
Mine & Smelter Supply Co.
Pennsylvania Smelting Co.
Stanley, W. F. & Co., Ltd.

Ash Conveyors:
Canadian Link-Belt Company

Ashes Handling Machinery:
Canadian Link-Belt Co., Ltd.

Assayers and Chemists:
Milton L. Hersey Co., Ltd.
Campbell & Deyell
Ledoux & Co.
Thos. Heys & Son
C. L. Constant Co.

Asbestos:
Everitt & Co.

Balls:
Hull Iron & Steel Foundries, Ltd.
Peacock Brothers Limited.
The Wabi Iron Works.
The Hardinge Conical Mill Co
The William Kennedy & Sons, Ltd.

Ball Mills:
Hardinge Conical Mill Co.
Hull Iron & Steel Foundries, Ltd.
The Wabi Iron Works.
The William Kennedy & Sons, Ltd.

Babbit Metals:
Canada Metal Co.
Hoyt Metal Co.

Ball Mill Feeders:
Hardinge Conical Mill Co.
Hull Iron & Steel Foundries, Ltd

Ball Mill Linings:
Hardinge Conical Mill Co
The William Kennedy & Sons, Ltd.
Peacock Brothers, Limited
Hull Iron & Steel Foundries, Ltd.

Belting—Leather, Rubber and Cotton:
Canadian Link-Belt Co., Ltd.
The Mine & Smelter Supply Co
Northern Canada Supply Co.
Jones & Glasco.

Belting:
R. T. Gilman & Co
Gutta Percha & Rubber, Ltd

Belting—Silent Chain:
Canadian Link-Belt Co., Ltd.
Hans Renold of Canada, Limited, Montreal
Jones & Glassco (Regd.)

Belting (Transmission):
Goodyear Tire & Rubber Co

Belting (Elevator):
Goodyear Tire & Rubber Co

Belting (Conveyor):
Goodyear Tire & Rubber Co
Gutta Percha & Rubber, Ltd

Bins and Hoppers:
The Toronto Iron Works, Ltd.
Can. Chicago Bridge & Iron Co., Ltd.
Horton Steel Works, Limited.

Blasting Batteries and Supplies:
Canadian Ingersoll-Rand Co., Ltd
Mussens, Ltd.
Canadian Explosives, Ltd.
Powley & Townsley, Limited.

Bluestone:
The Consolidated Mining & Smelting Co
The Coniagas Reduction Co., Ltd.

Blowers:
Canadian Fairbanks-Morse Co., Ltd
Northern Canada Supply Co.

Boilers:
Canadian Ingersoll-Rand Co., Ltd.
Marsh Engineering Works
R. T. Gilman & Co.
The John Inglis Company
Wabi Iron Works.

Blue Vitriol (Coniagas Red):
Canadian Fairbanks-Morse Co., Ltd

Bortz and Carbons:
Diamond Drill Carbon Co.

Boxes, Cable Junction:
Standard Underground Cable Co. of Canada, Ltd.
Northern Electric Co., Ltd.

Brazilian Rough Diamonds:
Diamond Drill Carbon Co.

Brazilian Mica:
Diamond Drill Carbon Co.

Buggies, Mine Car (Steel)
Hendrick Manufacturing Co

Brazilian Ballas:
Diamond Drill Carbon Co.

Brazilian Rock Crystal:
Diamond Drill Carbon Co.

Brazilian Tourmalines:
Diamond Drill Carbon Co.

Brazilian Aquamarines:
Diamond Drill Carbon Co.

Bridges—Man Trolley and Rope Operated—Material Handling
Canadian Mead-Morrison Co., Limited

Bronze, Manganese, Perforated and Plain:
Hendrick Manufacturing Co.

Buckets:
Canadian Ingersoll-Rand Co., Ltd.
R. T. Gilman & Co.
Hendrick Manufacturing Co.
Canadian Link-Belt Co., Ltd.
Marsh Engineering Works
Mussens, Ltd.
MacKinnon Steel Co., Ltd.
Northern Canada Supply Co.
The Wabi Iron Works

Buckets, Elevator:
Canadian Link-Belt Co., Ltd.
Hendrick Mfg. Co.
Peacock Brothers Limited.

Cable—Aerial and Underground:
Canada Wire & Cable Co.
Northern Canada Supply Co.
Standard Underground Cable Co. of Canada, Ltd
Peacock Brothers, Limited

Cableways:
Canadian Mead-Morrison Co., Limited
Fraser & Chalmers of Canada, Ltd.
Mussens, Ltd.
The Wabi Iron Works
R. T. Gilman & Co.

Cages:
Canadian Ingersoll-Rand Co., Ltd., Montreal, Que
Northern Canada Supply Co.
Fraser & Chalmers of Canada, Ltd
The Electric Steel & Metals Co
The Mine & Smelter Supply Co
Mussens, Ltd.
The Wabi Iron Works

INTERNATIONAL GEOLOGICAL CONGRESS.
To Be Held In Belgium In 1922.

At the meeting of the International Geological Congress in Canada in 1913 it was decided to hold the next Congress in Belgium in about three years time.

The Belgium Committee of Organization has just issued a circular in which they say:

"The brutal invasion of our soil in disregard of agreements, the ruin and destruction caused by the war, the distress of the whole country have caused the prolonged adjournment of the meeting. But sympathetic requests, coming from all quarters, have induced us to delay no longer.

"In the name of the Committee of Organization, we have the honour to inform you that an International Geological Congress will be held in Belgium during the second part of the month of August, 1922, and to invite you to take part therein.

"Excursions will take place before, during and after the session; they will extend to all parts of our country, of which the geological features are so varied and have already been studied in great detail.

The President of the Congress is M. Jean Lebacqz, Director General of Mines, and the Secretary is M. Armand Renier, Director of the Geological Survey. Circulars concerning the Congress may be had by addressing the Secretary, Palais du Cinquantenaire, Brussels.

PRODUCTION OF UNITED STATES ASPHALT INCREASES.

The quantity of native asphalt and native bitumens sold in the United States in 1920 was 198,497 short tons, valued at $1,213,908, according to the United States Geological Survey, Department of the Interior. This was an increase of 125 per cent in quantity and of about 78 per cent in value over 1919. Gilsonite was reported from Uinta County, Utah, wurtzilite (or elaterite) from Duchesne County, Utah, and grahamite from Pushmataha County, Okla.

The sales of manufactured asphalt obtained from domestic petroleum amounted to 700,496 short tons, valued at $11,985,457, or $17.11 a ton. Compared with 1919 these figures indicate an increase of 14 per cent in quantity and 37 per cent in value.

The sales of asphalt manufactured in the United States from Mexican petroleum in 1920 amounted to 1,045,779 short tons, valued at $14,272,862, or $13.65 a ton. This was an increase of 55 per cent in quantity and of 85 per cent in value over 1919.

SOME FIRES IN MINING CAMPS.

During the past few weeks of unusually hot weather, mining and lumbering camps in Northern Ontario have to a large extent escaped serious damage by fire. Experience in other dry summers has resulted in much clearing around all camp buildings and in better fire fighting equipment in towns and at mines. The great heat has, however, made the forests ready for fire and numerous bush fires are reported. Two weeks ago the transmission line of Associated Gold Fields was damaged by fire, but was soon repaired. Fire threatened the plant at Raven Falls, but was successfully fought there. At Bourkes, fire has destroyed some of the buildings of the Bourkes Mining Co. The Argonant mine suffered from fire a few weeks ago which damaged its mill. Considering the very dry weather, however, and the large number of small fires, the mining districts have not suffered very heavy damage.

MINING TANKS MADE IN TORONTO.

Among mining men one often hears high, and, one may add, deserved, encomiums passed on the Toronto Mining Tanks manufactured by the Ontario Wind Engine and Pump Company, Ltd., of Toronto, and with branches at Calgary, Regina, Montreal and Winnipeg. Those in a position to know speak enthusiastically of the service given by these tanks—a service which they attribute, first, to the excellence of the material from which they are built, and, secondly, to the first-class workmanship that goes into their construction.

These tanks are specially constructed for the Cyaniding process. They have to retain heavy and precious liquids as high as 80 lbs. pressure to the cubic foot. They are made of British Columbia Fir, Redwood, Gulf Red Cypress, and also in White Pine. All Toronto Tank stocks are air-dried. This process necessitates a greater expenditure of time than does kiln-drying. But it means longer life and superior material in every way—for it means absolutely and perfectly seasoned material.

The Ontario Wind Engine and Pump Company, Ltd. not only manufactures agitator and thickening tanks, but also supplies tanks for Water Supplies, or any other purpose for which tanks are needed, in any shape or size or kind of wood.

It may be added that Toronto Mining Tanks have been supplied to the Dominion Reduction Company, of Cobalt, Ont.; the Shumacher Mines, of South Porcupine, Ont.; the McIntyre Mines, Ltd., of Porcupine, Ont.; the Kerr Lake Mines, Ltd., of Cobalt, Ont.; and many others.

CROWN RESERVE.

On the Crown Reserve claims at Larder Lake a number of men have been engaged in surface exploration this summer. It is said that some diamond drilling will be done by the company.

ASSOCIATED GOLDFIELDS.

Development of the Kerr Addison orebody is being steadily carried on by Canadian Associated Goldfields at Larder Lake. The shaft is being deepened and lateral development is under way.

Hollinger will pay a dividend of 1 per cent Sept 9. This makes a total of $2,214,000 so far this year.

EDITORIAL

MR. GRAY ACCEPTS IMPORTANT POSITION.

Rarely does a publisher enjoy the services of a man of such excellent qualifications, both from training and experience, as are combined in Mr. F. W. Gray who has just resigned his position as editor of the Canadian Mining Journal and of Iron and Steel of Canada.

The fields of these two journals, while in a sense distinct, are yet so closely related that it is a distinct advantage to have the editorial work in the hands of a man who so thoroughly appreciates the various situations in both industries and can immediately make the most use of changes in conditions which he, as a leader and moulder of opinion, must be able to do if the journal is to function at its maximum efficiency. The Industrial and Educational Publishing Company takes this opportunity to express its very deep and hearty appreciation not only of Mr. Gray's exceptional ability but also his untiring, conscientious efforts to serve in every possible way, the best interests of Canada's mining and metallurgical industries.

Mr. Gray was born in England and came to Canada in 1904 when he entered the services of the Dominion Coal Company and remained with them for 14 years, holding the position of confidential assistant to various general managers. He received his early practical experience in the South Yorkshire coal mines under the late G. Blake Walker who was also recently President of the Institute of Mining Engineers. In 1918 Mr. Gray went with the Nova Scotia Steel and Coal Company where he remained until he became editor of the Canadian Mining Journal and Iron and Steel of Canada in 1919. Mr. Gray's work has brought him in constant contact with the steel industry and this with his studious disposition, has made him a master of many phases of that great industry. He is a thorough optimist with regard to the future of Canada's mining and metallurgical industries. He has made careful studies of Canada's fuel supply from every phase of that subject and has contributed many valuable papers to the scientific organizations to which he belongs, principal among which may be mentioned the Institute of Mining Engineers, Canadian Mining Institute, and the Engineering Institute of Canada, of which society he has been a council member.

Mr. Gray's outstanding ability has naturally brought him many opportunities for industrial positions and it was his good fortune to be offered the position of Assistant to Mr. D. H. McDougall, Vice-President of the British Empire and Steel Corporation.

The publishers of Mr. Gray's magazines because they have indeed acquired a character due to his inspiration and contact, wish him every success in his new work. Fortunately for those with whom he now severs his business connection, Mr. Gray will continue to reside in our community.

THE BLUE DIAMOND MINE.

Owing to the fact that the Blue Diamond coal mine is controlled by companies which have a large number of shareholders, the story of its development is of exceptional interest, and considerable space is given to it in this number of the Journal. The mine is the property of the Blue Diamond Coal Company Ltd., and the whole of the capital stock of this company is owned by McIntyre Porcupine Mines Ltd. and Temiskaming Mining Company, Ltd.

The venture of these Eastern gold and silver mining companies into the Western coal mining business has been the subject of much comment, favorable and unfavorable, as might naturally be expected when it is borne in mind that comparatively few of the several thousand shareholders of the holding company have been previously interested in coal mining in Alberta. Diverse views as to the policy of expansion of opera

tions are to be expected, regardless of the fact that the life of most mines is short, for some of the shareholders have little desire to take part in the making of new mines, while others are chiefly interested in mining enterprises, because of the chances of making large profits by taking the risks that development of a new mine necessitates. The latter group of shareholders will probably find in the report, information that will give them much satisfaction, while the other group will merely see, in the statement of "profit and loss", evidence that the investment was unwise.

Some of the difficulties that have been encountered and overcome are set forth fully in the report. The statements concerning labor difficulties are particularly interesting, since they record happenings in a very trying time in the history of industrial enterprises.

The story of the development and equipment of the mine and of the preparation being made for increasing the output to 2,500 tons per day shows that much good work has been done, and that the company intends to have one of the big coal mines of Alberta. Particularly pleasing are the statements concerning the quality of the coal opened up during the year and the favor of the mine product has found with the railways.

President Bickell and his associates are to be congratulated on their enterprise. We hope for them that they will be as successful in the coal mining business as they have been in gold mining.

GOLD MINING IN SOUTH AFRICA DECLINING.

The thirty-first annual report of the Transvaal Chamber of Mines, covering the year 1920, contains a wealth of information concerning the gold mining industry of South Africa, the world's greatest gold-producing country. The Chamber of Mines is an active body having held a total of 420 meetings, during the year,—four general meetings, forty-five executive committee meetings and 371 sub-committee, etc., meetings. Its activities are such that the Chamber has a great influence on the industry. Its reports are authoritative and present an exceptionally good summary of the results obtained during the year.

It is because of these facts that unusual interest is attached to the address of the president, in which he states, in moving the adoption of the report, that "it has to be recognized that gold mining in the Transvaal is at present a shrinking industry. Every year since 1916, when the production was 9,295,538 oz., the output has been smaller than that of the previous year; and this year's production of 8,154,172 oz. is the smallest since 1910."

To a considerable extent the decrease is due to natural causes which cannot be affected by the action of operators, for mines must be worked out sooner or later. It will be possible to prolong the life of some of the mines, if the cost of living continues downward and permits decrease in wages, and some of the mines will produce large quantities for years at present costs, but several mines are operating at a loss and the Simmer Deep, Knights Deep, Jupiter, New Heriot and Princess Estate are closed down. It is obvious that the cost of mining in South Africa is not leaving a sufficient margin of profit and that the workmen will have to be satisfied with less wages if they wish the gold mining industry to prosper.

The gold mining industry of South Africa is one of large magnitude, and it is to be hoped that means will be found for greatly extending its life by increased efficiency and lower costs. The war time costs and the period of high wages which followed the war have been hard on the industry, and will prove to have been hard on the employees, if they do not meet the operators half way in the attempt to put the industry again on a sound basis. There were employed during 1920 by the mining companies operating in the Transvaal 20,821 whites and 175,128 colored workmen. There was milled during the year 24,096,277 tons ore yielding 7,949,585 oz. gold, or about one half the world's output. To maintain this output is a difficult task, and the best that can be expected is that the co-operation of owners and labor leaders may be obtained in an effort to prevent the production from declining rapidly.

DR. R. C. WALLACE.

The resignation of Dr. R. C. Wallace, Commissioner of Northern Manitoba, took effect on September 1st. His successor has not yet been named.

When the post was created, a few years ago, and Dr. Wallace was appointed, it was believed that Northern Manitoba would benefit greatly. Results of his work were soon apparent and much was done in the way of obtaining and publishing reliable information concerning the natural resources of the very large area that came under his supervision. Our correspondent at The Pas, which has been Dr. Wallace's headquarters, tells on another page something of the nature of his work. As a pioneer in new ground the first commissioner gained the confidence of men interested in mining, pointed out opportunities and helped prospectors and mining companies in many ways. He returns now to his work at the University of Manitoba, and his interest in the Northern part of the province will leave its mark on his students and associates there.

The successor to Dr. Wallace has not yet been named. It is to be hoped that there will be no let up in the work begun by him. An active Commissioner can do much towards helping in the development of resources.

While licensing of engineers appears to meet with little favor among mining engineers, there are now nineteen states which require engineers practicing within their borders to be licensed and sixteen other states have such laws under consideration.

INSTITUTE MEETINGS.

Two meetings are being held this week that will interest a numer of mining engineers. At Edmonton the Western branch of the Canadian Institute of Mining & Metallurgy is holding its annual meeting. At Wilkes-Barre, Penna., the American Institute of Mining & Metallurgical Engineers is holding its semi-centennial meeting. It is unfortunate that the meetings clash; but, owing to the distance apart of the places of meeting, this should not affect the attendance at either seriously. A number of Easterners will be much interested in the Edmonton meeting, but will be unable to make the long trip. The Journal is making arrangements for a full account of proceedings.

REPEATED SHUT-DOWNS OF COKE OVENS.

In "Iron Age" of 14th July appears a useful and practical article by J. M. Hastings Jr. recording a series of frequent shut-downs of by-product coke-ovens which occurred at a plant near Wheeling, W. Va., and by reason of the taking of proper precautions resulted in no injury to the oven linings. It has long been a tradition among coke-oven operators that if a battery of ovens were allowed to go cold, heavy repairs would be required to remedy the damage resulting from contraction, and it has often been necessary to incur heavy expenditure to maintain sufficient heat in by-product ovens to prevent the consequences of shutting-down the ovens completely. The type of oven, and the provision of ties and stays permitting adjustment to varied stages of expansion and contraction, is probably a deciding factor, and, where the necessity for shut-downs is apprehended, it would appear advisable to give consideration to this point. Mr. Hastings' article is reproduced in this issue.

EDITORIAL NOTES.

While development of mineral resources in Canada is largely dependent on outside capital, we make a better showing than South Africa in the case of gold mining. According to Sir Lionel Phillips, practically all the money provided for the development of the mines of the Transvaal, until a production of 200,000 oz. a month was reached, came from overseas. In Canada considerable sums of money have been raised for development of mines, though we are still very largely dependent on United States capital.

The Federated American Engineering Societies has developed an employment service that is reported to be of great service to engineers and employers of engineers. About one hundred men are placed each month.

Reports from Cobalt indicate that good results are being obtained in development work at some of the mines. Such results if accompanied by a rise in the price of silver will lead to renewed activity in the silver area.

Mr. JAMES A. RICHARDS.

Mr. James A. Richards, Inspector of Mines of Alberta, being, says the Bulletin of the Canadian Institute of Mining and Metallurgy, the son of a Cornishman, it would be difficult to say whether he chose mining as a profession, or whether mining had already adopted him as one of its own long before he was capable of making any conscious choice. In either case, he has worthily upheld the traditions both of Cornwall and of the mining profession. For a period of more than thirty years he has had a rich and wide experience in most of the important coal-mining districts in British Columbia and Alberta, and his advancement in the profession has marched step by step with the rapid development of the coal-mining industry in these provinces.

Mr. Richards' father removed from England to Canada in 1884, and five years later, young Richards, having then left school, came out to join his father in Wellington, B.C. There he obtained employment at the mines, and almost from the first had the good fortune to work under the late Mr. Alexander Sharp, from whom he received his first real instruction in mine surveying and general mining engineering. Richards proved himself an apt pupil, with the result that, in 1893, he was placed in charge of mine surveys at the Wellington collieries, a position he retained for the following six years. At the end of that period he went to Nanaimo as Assistant Surveyor, and two years later, in 1901, he received further promotion and was placed in charge of survey work at the mines there. This position Mr. Richards relinquished in July, 1904, to accept an appointment as fireboss at Cumberland, where he remained until 1907. From there he went to Michel, in the Crowsnest, but within three months of his arrival there, he was offered, and accepted, the position of Manager for the Royal collieries at Lethbridge.

Thus, after eighteen years very active work in the collieries of British Columbia, Mr. Richards crossed the Rockies into Alberta, and he has been true to his new love ever since. He remained at the Royal collieries until 1909, and then, during the following five years, was in charge, as manager, of various mines in the Edmonton and Lethbridge districts, until, in 1914, he was appointed District Inspector of Mines for the Province of Alberta; at first in charge of the Crowsnest Pass district, then in the Calgary district until April, 1916, when he was transferred to the Edmonton district. Mr. Richards continued in charge of this district until 1918, in which year further promotion came with his appointment as Senior Inspector of Mines for the province; and in 1920, during the absence through ill-health of Mr. J. T. Stirling, the Chief Inspector, he very ably filled the breach and became Acting Chief Inspector. In addition to field-work, Mr. Richards' official duties have included, since 1917, the important task of compiling the Annual Report of the Alberta Mines Branch.

ACCIDENTS IN IRON MINES.

Reports received by the United States Bureau of Mines from operators of iron mines throughout the country show that accidents in the year 1920 resulted in 106 deaths and 9,072 non-fatal injuries. The figures represent decreases of 33 fatal and 26 non-fatal accidents as compared with the previous year. The iron mining industry employed 45,990 men. The figures indicate a fatality rate of 2.34 and an injury rate of 200.49 per 1,000 men employed.

Losses from Leakage in Compressed Air Lines and Apparatus with some notes to their Detection and Prevention

By F. A. McLEAN, Assoc. M.C.I.M.M.

Very few people fully realize the extent of the losses due to leakage of compressed air; yet a hole one-eighth of an inch in diameter will cause the loss of more than 25 cubic feet per minute, or enough to run a small riveting, chipping or caulking hammer; a quarter-inch hole will allow over 100 cubic feet per minute to escape, or enough to run a fair-sized air hoist, large air tool, or a modern self-rotating hand hammer-drill or stoper.

Leakage from holes as large as 1/8 or 1/4 inch can hardly go unnoticed very long, but a multitude of smaller leaks may remain undetected for some time and yet waste as much, or even more air than two or three large ones. The importance of frequent inspection of air lines is evident from a little study of the following figures, showing the actual cost of leakage losses from small holes in dollars and cents per year.

If we assume that 1 cubic foot of air per minute at 100 pounds pressure from a motor-driven compressor costs $5.00 per year, with electricity at one cent per Kw. Hr. (a figure that will be too low in some cases) interest and depreciation at 10%, and a year has 300 eight-hour working days, a 1/64" hole will waste .40 cubic feet of air per minute, or $2.00 worth a year, a 1/32" hole 1.61 cubic feet per minute or $8.00 worth a year, and a 1/16" hole 6.45 cubic feet per minute, or $32.00 worth a year. Further calculation of the possible losses through leakage in air lines may be made by applying the above constant to the discharge volume shown in the table in Figure 1.

Where leakage is suspected, the compressor may be run during noon-hour, or at some other period when the machines or tools are idle, in order to determine how many r.p.m. it must make in order to take care of leakage alone since, when the machinery is idle no effective work is being done. If it requires 50 r.p.m. of the compressor to keep up the pressure with all machines idle, it is evident that if the compressor is normally run at 200 r.p.m. only 150 r.p.m. are actually furnishing air for efficient use, the other 50 r.p.m. merely compensating for leakage. Where such conditions exist, the obvious remedy is to find and stop the leaks.

Method of Detecting Small Leaks.

There are a number of rough and ready methods for detecting small leaks, one of the oldest being a lighted candle held at the pipe joints, hose connections or other suspected points. Soapy water swabbed around the joints is also quite effective and reveals the presence of escaping air by bubbling. Another method is to inject some substance with a strong odor, such as oil of peppermint, into the air lines and then have the pipes inspected. The location of the leaks will then be revealed by the odor. Pipe lines may be tested for drop in pressure from leaks or friction during transmission, by placing a gauge near the point of use and comparing its reading with that of the gauge on the receiver.

Losses From Worn-Out Equipment.

If we multiply the figures covering the cost of small leaks in dollars and cents per year, as previously given, by the number of leaks likely to be found around the average plant and add to this the loss of time and inconvenience caused by too low a pressure at the tool, it is easy to see that leaks are rather an expensive proposition; and when one stops to consider that losses from worn-out equipment with its high air-consumption and low power are likely to be just as costly, the value of some simple and reliable means of detecting these losses is apparent.

Practical men can judge the work performed by drills, tools and other pneumatic appliances, but there is no way of "judging" when the air consumption of individual machines becomes excessive. The rated consumption of an air tool or appliance may be exceeded

Discharge of Air Through an Orifice in Cubic Feet of Free Air per Minute.

FLOWING FROM A ROUND HOLE IN RECEIVER INTO THE ATMOSPHERE.

	RECEIVER GAGE PRESSURE																
Diam. of Orifice in.	2 Pounds	5 Pounds	10 Pounds	15 Pounds	20 Pounds	25 Pounds	30 Pounds	35 Pounds	40 Pounds	45 Pounds	50 Pounds	60 Pounds	70 Pounds	80 Pounds	90 Pounds	100 Pounds	125 Pounds
1/64	.038	.0597	.0842	.103	.119	.133	.156	.173	.19	.208	.225	.26	.295	.33	.364	.40	.486
1/32	.153	.242	.342	.418	.485	.54	.632	.71	.77	.843	.914	1.05	1.19	1.33	1.47	1.61	1.97
1/16	.647	.965	1.36	1.67	1.93	2.16	2.52	2.80	3.07	3.36	3.64	4.2	4.76	5.32	5.87	6.45	7.85
1/8	2.435	3.86	5.45	6.65	7.7	8.6	10.	11.2	12.27	13.4	14.50	10.8	19.	21.2	23.50	25.8	31.4
1/4	9.74	15.40	21.8	26.70	30.8	34.5	40.	44.7	49.09	53.8	58.2	67.	76.	85.	94.	103.	125.
3/8	21.95	34.60	49.	60.	69.	77.	90.	100.	110.45	121.	130.	151.	171.	191.	211.	231.	282.
1/2	39.	61.60	87.	107.	123.	138.	161.	179.	196.35	215.	232.	268.	304.	340.	376.	412.	502.
5/8	61.	96.50	136.	167.	193.	216.	252.	280.	306.80	336.	364.	420.	476.	532.	587.	645.	785
3/4	87.60	133.	196.	240.	277.	310.	362.	400.	441.79	482.	522.	604.	685.	765.	843.	925.	.....
7/8	119.50	189.	267.	326.	378	422.	493.	550.	601.32	658.	710.	622.	930.	1004.	.....	.....	.....
1	156.	247.	350.	427.	494	550.	645.	715.	785.40	860.	930.	.....	.....	.....	.....	.....	.....
1 1/4	242.	384.	543.	665.	770.	860.	1000.	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....
1 1/2	350.	550.	780.	960.	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....
2	625.	985.	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....

by 100% or more and yet the device will work fairly well. Losses of this kind are not as easy to find as those in pipes, hose couplings, etc., which manifest their presence by the air of the lighted candle, soapy water, etc., and the only accurate way of detecting them is to measure and compare the actual volume of air consumed by the tool with the manufacturer's rating.

There are various types of air meters on the market, among which may be mentioned, the Westcott, the St. John, and the more recently developed New Jersey. The latter, on account of its simple, rugged construction, reliability in operation and the convenience with which it may be moved about, is particularly adapted to use around the machine shop or foundry, on construction jobs and in mines and quarries.

The New Jersey Meter — Fig. 2 — is unique in that it has only one moving element which floats on air and is practically frictionless and non-wearing. There are

Fig.2.
A small Air Meter designed for use with small drills and pneumatic tools, and hence called a Tool-Om-Eter.

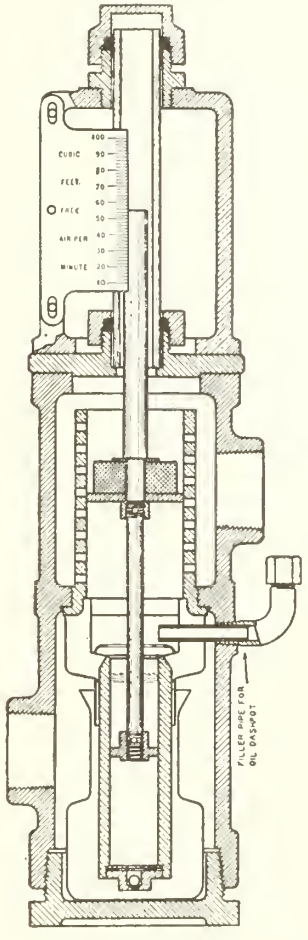
no rubber or leather discs, pockets or diaphragms, bearings, gears, valves or other parts to wear, break, leak or get out of adjustment and change the accuracy of the instrument, nor, it is claimed, can it be put out of order by a flow of air in excess of its measuring capacity.

Corrosion is taken care of by bronze parts where necessary, and the meters are supplied in two sizes with 1'' and 2'' inlet and outlet connections. The 1'' size, or Tool-om-eter as it is called—Fig. 3— is suitable for use where the flow of air to be measured does not exceed 100 cubic feet of free air per minute at pressures of 100 pounds and under. Its principal application, as indicated by its name, is in connection with the measurement of air consumed by various pneumatic tools, such as riveting and chipping hammers, metal-drilling and wood-boring machines, sand rammers, plug drills, and other pneumatic appliances rated by the manufacturer at not over 60 to 100 cubic feet of air per minute when new.

The 2'' New Jersey Meter, is called Drill-om-eter and has a capacity of 300 cubic feet of free air per minute at 100 pounds and under. It is adapted to metering the air consumed by mounted rock-drills, coal cutters and punchers, sand blasts, air-lift pumps, air hoists, pile drivers, air motors, submarine drills, etc., where the actual consumption is not over 300 cubic feet per minute.

Principle of Operation.

The volume of a definite compressed fluid or gas,



PATENTS PENDING

Fig. 3.
Cross-section of the new Jersey Air Meter showing operating principle and simplicity of construction.

flowing under a small constant head through multiple orifices of the same shape and size, is directly proportional to the number of orifices exposed to the flow, and it is this principle or natural law that is made use of in the operation of the New Jersey Air Meter.

In operation, a small head or difference of pressure is established between the interior of the cylinder and the outlet chamber, the pressure difference (but a few ounces) being fixed at the exact weight of the single moving element and the area of the pistons on which the difference of pressure acts. (See Fig. 3.) The moving element rises until its weight is exactly supported by the difference in pressure; the pistons and rod are then floating in a static balance in a position corresponding to the volume of air flowing, the number of holes exposed and the height of the top of the rod in the sight glass. The meter thus automatically adjusts itself to

the conditions required, by the principle or natural law as previously mentioned.

The New Jersey instrument is not a velocity meter that would give readings proportional to the square of the volume flowing, but is a direct volume gauge with a uniform scale on which one cubic foot is represented by the same distance, whether working at low or high capacity.

Use of Scales at Various Pressures.

The scales of these instruments are accurately calibrated by comparison with a standardized instrument and are graduated for use on pressures of 80 pounds and under at the inlet connection. If the actual pressure at this point is above or below 80 pounds, the capacity of the meter will be raised or lowered in the ratio shown by the *constant* corresponding to the given pressure in the following table, (See Fig. 4) which is based on 14.7 lbs. absolute pressure and a temperature of 60' Fahr. Example: A Tool-om-eter or Drill-om-eter is operating under a gauge pressure of 30 lbs. with its scale reading 100 cubic feet of free air per minute. Corrected reading will be 68.7 cubic feet of free air per minute.

It might be thought that when left floating on the line the resistance of these meters would cause some drop in pressure, but by actual experiment this has been found so small that it cannot be detected by a gauge and they are adapted to the detection and measuring of leakage in air lines, valves, hose cocks, etc., the determination of net volume of air produced by compressors for comparison with nominal rating or displacement. They will show at a glance how much air is used by drill, riveters, chippers, air hoists, pumps, etc., when they are new, six months, or a year after, before and after overhauling, or whenever it is desirable to know.

How To Obtain The Greatest Benefit From The Use Of Air Meters.

To get the best results requires systematic and frequent tests so that the effect of use and the necessity for repairs can be determined. Some types of tools will deteriorate rapidly, others hold up longer in service. A single test on one tool is not conclusive as to whether it is of better type than another. It is necessary to get the life history of as many tools of each kind as are available and analyze the results. A book to assist in keeping records in permanent form so that the necessary information as to life, economy and cost of maintenance can be accumulated, is well worth the little trouble and attention it requires.

With some types of tool the flow is very jerky and, if the indicating rod tends to pulsate, conditions may be improved by using a long hose (50 feet or more) of a size larger than the regular hose commonly used with the tool. Another method of accomplishing the same result is to connect a small storage-tank into the hose between the meter and the tool: this can be made of a piece of 4-inch pipe about 3-feet long for the small meter or a 6-inch pipe 4 feet long for the larger size. The kind of oil used in the dashpot has a considerable effect: a heavy machine-oil or cylinder oil will have a greater dashpot action than the thinner "air oils."

The meter reads direct in cubic feet of free air per minute at the usual working-pressure of 80 pounds per square inch, with a correction of approximately 5 per cent for each 10 pounds variation in the air pressure. The exact correction factor is given on the scale plate for pressures from 60 to 100, and is shown in the table Fig. 4 for other pressures. The air pressure on the supply pipe at the inlet of the meter should be taken with a good gauge and recorded with the scale reading of the meter. The air consumption of most devices varies considerable according to the pressure used.

Tests should be made with tools working under similar conditions at different times. Riveting hammers can be tested on actual work or striking on a block. Piston and rotary metal drills used for drilling, reaming, etc., can be tested accurately with a brake load. Take the speed and the net weight in pounds on the brake to figure out the foot-pounds work per minute, or the horse-power, which gives a positive measure of the work done by the drill. Another method is to use a twist drill of a certain size and in good condition, drilling a hole in a cast-iron block and measuring the metal removed per minute in comparison with the air consumed. In drilling steel it is difficult to feed the drill reg-

TABLE of PRESSURE COEFFICIENTS or MULTIPLIERS for REDUCING SCALE Readings of TOOL-OM-ETER and DRILL-OM-ETER to Cubic Feet of Free Air per Minute, Stated in Terms of Air at the Barometric Pressure at the Elevation where the Meter is used.

Elevation above Sea Level	Barometer Inches of Mercury	Absolute Pressure of Atmosphere	Gauge Pressure in pounds per square inch on inlet side of meter											
			100	90	80	70	60	50	40	30	20	10	5	2
70	29.92'	14.7#	1.101	1.051	1.000	.946	.888	.827	.760	.687	.605	.511	.456	.420
1000	28.85	14.17	1.139	1.088	1.035	.978	.918	.854	.785	.709	.623	.524	.467	.429
2000	27.78	13.64	1.181	1.127	1.072	1.013	.950	.884	.811	.732	.642	.539	.478	.438
3000	26.74	13.13	1.224	1.168	1.110	1.049	.984	.914	.839	.756	.662	.553	.490	.448
4000	25.70	12.63	1.269	1.212	1.151	1.087	1.019	.947	.868	.781	.683	.569	.502	.458
5000	24.73	12.15	1.316	1.257	1.194	1.127	1.056	.980	.898	.807	.705	.585	.515	.468
6000	23.83	11.71	1.363	1.301	1.235	1.166	1.092	1.013	.928	.833	.726	.601	.527	.478
7000	22.93	11.27.	1.414	1.349	1.281	1.209	1.132	1.049	.960	.861	.750	.618	.541	.488
8000	22.04	10.84	1.467	1.399	1.328	1.253	1.173	1.087	.994	.891	.774	.636	.555	.499
9000	21.22	10.43	1.522	1.451	1.377	1.299	1.213	1.125	1.029	.921	.799	.655	.569	.511
10000	20.43	10.05	1.577	1.503	1.427	1.345	1.258	1.165	1.069	.951	.824	.673	.583	.522

ularly enough to maintain a steady speed on the drill and a uniform air-consumption.

For rock drills of the piston type, consumption varies with the nature of the rock, depth and direction of hole, etc., and to get consistent comparative results tests should be made under standard conditions. One common method is to have the drill strike straight down on a steel block or a hardwood block with a steel plate on top, using a short piece of soft-steel rod in the drill chuck.

In measuring the consumption of air-lift wells the flow is very regular, with little tendency to pulsate, and if desired the dashpot may be filled with water instead of oil to avoid any possibility of getting oil into the well.

Metering Air At High And Low Temperatures.

The meters are calibrated in terms of air at "standard" conditions, that is, at sea level, or 14.7 pounds per square inch absolute pressure and 60° Fahr. or 520° absolute temperature. If air is warmer the meter will over-register approximately 1 per cent for each 11° Fahr. in excess of 60°. It is not necessary to take account of this ordinarily for pneumatic tools, etc., as the air consumption of a tool is also influenced by the temperature. For close measurements, where temperature has to be considered, multiply the meter reading by a temperature coefficient K=2 520 T + 460 in which "T" is the temperature in degrees Fahr. of the air passing through the meter.

From the foregoing it is evident that through the use of a good air-meter it is possible to tell whether or not a compressor is living up to its guaranteed rating and by showing up losses due to leakage, wear, poorly adjusted or inefficient apparatus, etc., they enable the progressive executive to get rid of "air eaters" and thus in many instances obtain more air without the purchase of additional compressor equipment.

DOMINION COAL OUTPUT.

The August output of the Dominion Collieries was 381,000 tons, the largest output in many months. Depressed trade conditions are not conducive to large monthly outputs, and although the Dominion collieries are fast getting into condition for almost old-time outputs yet these must wait on the market.

In two months No. 24 mine which is now being equipped with a new surface plant—will become a producer again with an output of 600 tons per day.

To meet the anticipated increased demand of the coming improved coal trade plans are well under way. Several new shafts will be sunk at points close to the sea-shores in order to win every ton of coal possible from the under sea areas. One of these now in process of sinking is thirty one feet four inches by thirteen feet two inches wide a very large shaft indeed. In the New Waterford district another shaft similarly situated on the shore line will be sunk. Other shafts will follow as the trade warrants.

A united effort is being made by management and miners to place clean coal in the market, and much improvement has taken place lately. Altogether the Glace Bay and Sydney Mines District are ready for big business when it comes.

NIPISSING MINES DIVIDEND.

N. Y. — Nipissing Mines Co. declared quarterly dividend of 3 per cent, same as three months ago, payable Oct. 20 to stock of record Sept. 30.

MANGANESE.

The Imperial Mineral Resources Bureau has published a note on Manganese covering the period 1913 to 1919 inclusive. Definitions of manganese-ore minerals, and a list of their uses are given. About 95 percent of the world's production of manganese ores, manganiferous iron-ores, and manganiferous zinc-residuum is used directly or indirectly in the manufacture of steel as a deoxidizer.

British India is the world's most important producer of manganese, although before the war Russia was foremost. Russia's record production of 1,234,900 tons in 1913 is now seen as forecasting some later events. Whether Russia is producing manganese ores or not at this time does not appear to be known. The more important producers during 1913 and 1919 were as follows:

Production of Manganese Ore (Long Tons).

	1913	1919
Russia & Georgia	1,234,900	.....
British India	815,047	534,995
Brazil	120,335	319,777
Spain	21,247	65,514
Italy	1,596	30,345
United States	4,048	55,322

Great Britain herself produces a little manganese ore, 17,456 tons in 1918 and 12,078 tons in 1919 having been mined in the United Kingdom. British countries producing manganese include also the Gold Coast, Union of South Africa, Australia, but Canada has not in recent years produced more than a few hundred tons annually. In Egypt (West-Central Sinai) valuable manganiferous deposits are reported.

The Report states that during the war Brazilian and other available ores were imported into the United States without the regard for cost that would have influenced buyers in normal times; but, with improved railway transportation from the State of Mines Geraes to Rio de Janeiro and better facilities for loading at that port, the Brazilian manganese ore industry, while continuing to find its best market in the United States, may perhaps become a more formidable competitor with India and Russia in European markets, although, when normal conditions are restored, Germany will certainly again obtain practically all her manganese-ore supplies from Russia.

The particulars regarding occurrence and development of manganiferous deposits in all parts of the world are very full, and accompanied by a mass of statistics.

The monograph can be obtained from H. M. Stationary Office, London, price 3s. 6d. plus postage.

At a recent meeting of the employees of the Western Fuel Corporation of Canada, Ltd., Nanaimo, B.C., an application by medical men, under contract to attend coal-mine employees in cases of necessity, for an increase in their remuneration of 50 cents per man per month was received. It was unanimously rejected.

Instead the miners decided to reduce the amount paid 25 cents per man per month. The resignation of the present medical staff also is to be called for the same to the effect in the lapse of six months and applications are to be called for, applicants to state the salary expected.

The Blue Diamond Coal Mine

In a report to the shareholders of McIntyre Porcupine Mines Limited and The Temiskaming Mining Company, Limited, the Directors of the Blue Diamond Coal Company Limited say:

"An exhaustive examination was made of the mining leases and property owned by the Blue Diamond Coal Co. Ltd., early in June of last year and the purchase of the whole of the capital stock by the McIntyre Porcupine Mines Ltd., and the Temiskaming Mining Company Limited, in equal shares, has been completed.

"An option was at the same time secured in favor of the Blue Diamond Coal Co. for a period of fifteen (15) years, from the Canadian Coalfields Limited, covering their holdings at Hay River and the bituminous and anthracite coal seams which extend at intervals for a distance of over forty (40) miles north-west on the coal measures beyond that point.

"It should be borne in mind that the present management were in control for less than ten months of the period, under review, during which time operations were suspended for a considerable time owing to labor difficulties which finally resulted in the Company obtaining open shop working conditions.

"The operating costs may appear misleading as regards operations since we took over the property, for they include losses of approximately $69,000 incurred for July and August (our production commencing on August 23rd, 1920) and also include retroactive pay to employees, owing to the ruling of the Director of Fuel Operations. The heavy expenditures incidental to exploration and development necessary to bring production to our present capacity are factors the immediate results of which are not yet apparent but which the Directors believe will very soon be manifested in satisfactory profits."

General Manager's Report.

General Manager Gordon F. Dickson says in part:

Mining operations were originally commenced on the Blue Diamond property in 1914 and approximately 650,000 tons of coal were produced to the 30th June, 1920, the whole being extracted from tunnels above drainage level. Practically no development work had been carried out and the tonnage of coal available in the workings at the time the property was taken over was negligible. There was, however, undoubted evidence, based on geological data and on an analysis of averages that the property was capable of producing a large and continuous output of high grade bituminous coal, if a thoroughly comprehensive scheme of development was adopted and the mine equipped with suitable plant and machinery for economical working. An important additional recommendation was the geographical position of the mines on the main line of the Canadian National Railways, distant 568 miles from Vancouver and 754 miles from Prince Rupert, at which ports it can confidently be assumed the future chief market for the coal will be found, outside of the Railway's requirements.

Labor Troubles.

The Company, having resigned membership of the Western Canada Coal Operators Association, was not a party to the general agreement concluded by that body with the United Mine Workers of America in June of last year and there was some delay before a final settlement as to the schedule rate for Contract Miners and Company men could be effected due to the necessity of submitting certain points in dispute to arbitration by the Director of Coal Operations. The question of granting "closed shop" to the United Mine Workers of America was carefully considered and eventually agreed upon as the best policy to adopt at that particular juncture, being in accordance with the attitude of the whole of the mines of the district, and in accordance with the recommendations of the Director of Coal Operations who had the power to fix the rates of pay and the selling prices of coal.

Prior to the conclusion of the agreement which was ultimately made with the United Mine Workers of America, the Blue Diamond Coal Co. Ltd. had been paying average rates for contract work equal to over 14 per cent more than the other bituminous mines of the district. The concessions gained, as the result of protracted negotiations and the ruling of the Director of Coal Operations, brought the rates down to a fair equivalent of those prevailing at mines working under similar conditions.

Work was resumed on the 25th of August after a stoppage of seven weeks and a limited production of coal from development was commenced. The necessary equipment of plant, machinery and buildings was pushed on rapidly, and as development progressed the tonnage output increased, until from two hundred and fifty tons (250) per day in August the production had reached eight hundred and fifty tons (850) daily in February of this year.

An organized attempt was made at this time by a section of the Miners to disrupt the successful progress of work by taking advantage of the fact that no Dockage Clause was included in the working agreement. Repeated efforts by the Company to have the usual understanding in this respect were ignored and the deliberate inclusion of rock with the coal eventually, necessitated the company taking a firm stand by refusing to accept coal containing an excessive quantity of rock from contract miners unless the question of dockage was fairly discussed and the customary deductions allowed.

Without any notice the miners ceased work thereby violating one of the principal clauses of their agreement and compelling the company to refuse further negotiations with the United Mine Workers of America under the "closed shop" conditions, which undoubtedly supplied means for organizing the trouble. After six weeks stoppage of production the men returned to work under "open shop" conditions, which have continued with absolute satisfaction since.

Development and Equipment.

Notwithstanding stoppages and delays, good progress has been made with development and equipment of the mine and it is now in shape for the delivering of 1,200 tons per day, which will be increased to 2,000 tons per day by the beginning of next year and eventually built up to 2,500 tons per day.

Exploration and development work include extensive Diamond Drilling and the driving of four slopes and one main level tunnel. Eventually all haulage will be done through one Main Slope which will be connected with the three seams already opened up, and through the Main High Level Tunnel. The former will be equipped with a steam haulage plant having a capacity of 1,000 tons per eight hour shift. The High Level Tunnel connected with the new Incline Tramway will have an output capacity of 1,000 tons per shift.

The whole scheme of equipment and development has been designed with the object of attaining a minimum cost for mining and handling the coal to the railroad cars. The results of diamond drilling and development work during the period have proved the existence of a much larger tonnage of coal than was originally estimated when the property was purchased. The coal now being opened up in the deeper ground is of generally higher quality than that near the surface and in heat units compares favorably with the average of the best imported steam coals.

The natural destination of the mine's product is to the Pacific Coast for bunkerage, as well as export, but with reduced freight rates it should have a wide distribution to important centres in the East as well.

The Blue Diamond Company's property consists of 3,359½ acres of coal lease on which four parallel seams of coal have been proved to exist over the full length of four miles. Plant, machinery and buildings are valued at $440,838. Townsite buildings consisting of General Store, Meat Market, Hotel, Recreation Hall and dwellings are valued at $180,580. The amount spent on equipment, buildings and improvements by the Blue Diamond Company since August last is $281,746.

Diamond Drilling was commenced in September last year and was continued to the middle of December when the work had to be stopped owing to weather conditions. It was resumed again in April of this year and is still in progress.

The amount of information gained from these drill holes is very valuable and has enabled laying out the extensive scheme of development now in progress.

The coal seams conform to the bent and folded condition of the enclosing strata forming a series of basins with intervening anticlines more or less removed by surface erosion. The pitch of the seams is to the northwest and the principal method of development is by Slopes driven downward from tipple level at a suitable angle to reach the bottom of the basins, from where levels are extended on both sides, or limbs, of the trough.

The development so far carried out has been partly of an exploratory character but designed to furnish necessary important information for the permanent scheme, while at the same time assisting production. The permanent plan of development is divided into two principal groups of workings, viz: High Level Tunnel and Slope on the upper sections of Nos. 2 and 3 seams. Main Slope on lower sections of Nos. 2 and 3 seams.

The workings of the High Level tunnel are already well advanced but the Main Slope has not yet been commenced, the work being delayed until certain definite necessary information is available from Diamond Drilling now in progress, as to the exact position of the bottom of the basins.

Both these main openings will command a very large tonnage of coal and will each be equipped with Haulage capacity for handling one thousand (1,000) tons per shift. The High Level tunnel is connected with tipple level by an inclined Self-Acting Tramway for delivery of all coal from the upper workings.

Results of Development Work.

The total footage of Slopes and Levels driven during the year was 5,323'. Generally the results of development work to date have been highly satisfactory. The seams in the deeper ground are consistent in width proving a larger available tonnage than anticipated and have shown improvement in quality as compared with the coal nearer the surface. Care has been exercised in handling the coal for supplying a clean product and obtaining for it an established reputation in this respect.

Due to strike periods and reduction of orders by the Railways the actual time the Mine was operated amounted to two hundred and four (204) days or 68 per cent only of the total possible working days for the fiscal year. The coal produced for the year was 115,718 tons.

Costs.

While opening up the mine for a largely increased production there is a considerable amount of work of a developmental character besides that charged directly to development account. This tends to increase working costs, as the proportion of pillar coal and coal above counter levels, extracted from newly opened areas, has been very small, while counter levels and raises, charged to working costs, have been pushed well ahead to furnish the necessary places for the future large output. The reduction in working costs per ton should be in direct proportion to the increase in tons produced.

Plant, Machinery and Equipment.

Up to July of last year, when the property was acquired, all coal had been mined from tunnels above drainage level, there being no machinery of any kind and insufficient power available for carrying out development in the deeper ground, or for the more efficient handling of the coal to effect necessary reduction in cost of operation. The erection of the additional plant, machinery and equipment was, therefore pushed on rapidly to further the development work and satisfactory progress was attained.

The following are particulars of the principal items of plant, machinery and equipment installed:—

Power House—Sullivan Compressor, R. T. Boiler, 72" x 18'. R. T. Boiler, 66" x 16'. Allis Chalmers Engine Generator, 110 K.W. Webster Feed Water Heater, 1000 H.P. 2 Feed Pumps. Complete new extra heavy steam piping for all boilers. Underwriters Fire Pump, 750 gals. per min. 2 new Water Storage Tanks, each 15,000 gals. capacity.

Addition to Power House Building.

No. 3 South Slope.—Allis Chalmers Electric Hoist, 75 H.P., 60 H.P. Boiler, Loco. Type. Pumping Station Cameron 10" x 5" x 13" Pump. Electric Fan, 40,000 cu. ft. per min. capacity. Ingersoll Rand 10" x 12' Steam Hoist, substituted for Electric Hoist. Air and Steam Pipe Line.

No. 2 South Slope—Jencks Double Drum 10" x 12" Hoist. Air and Steam Pipe Lines from Power House.

No. 1 South Tunnel—Flory 10 x 12 Double Drum Hoist. Ottomwa 8 x 10 Endless Rope Engine.

No. 2 North 6" x 8' Hoist and Pump.

High Level Tunnel—Inclined self-acting Tramway equipped with C Wheel. Brakes and Drum. 6" x 8" Hoist and Pump.

Complete telephone system has been installed throughout the surface buildings and underground, including a line laid and connection made with Brule Railway Station, $2\frac{3}{4}$ miles distant. Endless Rope Haulage was installed between No. 3 South slope and the tipple, necessitating heavy excavation and the laying of 1,800' of double road, erection of Framework, Pulleys, etc. For the Main Slope at No. 1 South a 20" x 42" First Motion Hoist with 6' Drums and Walker 200,000 cu. ft. Fan have been purchased and will shortly be installed with two 250 H.P. Water Tube Boilers.

Canadian Coal Fields Limited.

The claim holdings at the Hay River comprise 7,040 acres and have a length of approximately eight miles

on which three parallel seams have been proven to exist. The middle seam has been opened at iregular intervals and altogether has been exposed over a length of five miles crossing three spurs of the foothills. The average thickness of this seam is 40' and the average height above river level can be safely calculated at 450'. A conservative estimate of the Tonnage content above drainage level is 18,000,000 tons.

Of the two parallel seams, one distant about 400' to the south-west, appears to have an average thickness of about 12', and an estimate of the tonnage content above drainage level may be placed at 5,000,000 tons. Less prospecting work has been done on the third seam lying to the north-east and although its course does not run through so much high ground as those on the south-west side of the river a considerable tonnage of coal may be safely calculated as an addition to that estimated above.

The character of the coal varies from that in the Blue Diamond Mine, there being a higher percentage of volatile matter and less evidence of heat and pressure throughout the greater proportion of hard lumpy coal showing in the different surface exposures. It is an excellent bituminous coal and well suited for domestic use as well as for steam purposes. There is no doubt that the coal at depth should show corresponding improvement in condition and quality to that proved in the Blue Diamond Mine.

A survey has been made of a proposed extension of Spur Line from Brule, the distance being 35 miles to the centre of the Hay River properties. The maximum grade is 1¼ per cent and the country through which the line will pass is of unusually favorable character, there being no engineering difficulties whatever.

The natural advantages for cheap mining and handling of the coal to a Railway are exceptional, due to the situation of the seams and the general topography of the country, and with a comparatively small amount of development the Mines could be placed on a large producing basis.

The claims north of Hay River comprise a total of approximately 6,240 acres on the Sulphur and Smoky Rivers and Sheep Crek. A considerable portion of this area contains anthracite coal equal to the best American product. The proposed Railway route via Hay River from Brule passes within close distance of the seams and there are excellent natural facilities for cheap mining. The Dominion Government has withdrawn from location the unlocated territory in this district.

Conclusions.

In spite of unusual handicaps through labor troubles and the subsequent effects of the general depression causing phenomenal reduction in traffic on the railways, with lessened demand for coal, the general progress for the year has been good.

The development work accomplished in the Blue Diamond Mine has fully confirmed all the most conservative coal tonnage estimates and there is now proved a much larger quantity available in the seams so far opened than was at first calculated.

The mine is now in a position to supply 1,200 tons of coal per day and as the present programme of development advances the capacity is daily increasing. It is estimated that with certain construction work completed a 2,000 ton daily output will be reached by the end of the year.

The quality of the coal has shown improvement in the deeper ground and as the result of consistent effort to furnish a clean run-of-mine product it has been highly approved for Railway use. Owing to the demand of the C. N. Railways at the close of last year for the whole of the mine output no effort was made to find a market outside of their requirements. There is no doubt that the Blue Diamond Coal will find a ready market, when sought, on the West Coast for bunkerage, manufacturing and export purposes, on account of its high calorific value and excellent steaming qualities. Being a good coking coal it can be readily turned to a good profit in this direction also.

The extensive construction programme, to attain the output of 2,500 tons per day at the lowest possible cost, is partly accomplished. Notwithstanding the satisfactory progress made with the work there is still a good deal to do before the whole is completed. The marked saving in working expense anticipated will, however, rapidly redeem the additional capital expenditure.

The Hay River coal has the additional advantage of suiting a domestic market through the large proportion of lump material in the seams.

The anthracite claims however, to the north offer a wide prospect of supplying a much desired domestic fuel which should be able to compete favorably with American anthracite on the prairies and should have a very wide distribution on the Pacific Coast.

If the efforts of the growing population of farmers and producers of the Peace River District are successful in obtaining a Railway, by the direct natural route from Grande Prairie to Brule, for the shipment of their grain by the C. N. Railway to the Pacific Coast it will enable the opening up of these mines for profitable production.

In summing up the value and prospects of the Blue Diamond Company's property and holdings the important features are:—the large territory controlled by the Company on which coal has been proven; the undoubted quality of the coal; the unusually favorable situation of the mines at Brule for wide distribution of the product; the favorable prospects for opening up and operating the properties at Hay River and further North.

PROFIT AND LOSS STATEMENT.

Eighteen Months Ended June 30th, 1921.

Sales:		
Coal Sold to Railroad and Trade		$ 893,136.82
Coal sold at Mine		1,892.74
		895,029.56
Less:		
Cost to Produce and Ship		1,091,829.85
Deficit		196,800.29
Other Operating Earnings		39,672.80
Net Deficit—to Surplus		$ 157,127.49

PRODUCTION TONNAGE STATEMENT

Coal Stocks January 1st, 1920		0
Coal Mined to July 1st, 1921	183,963	
Coal Consumed for Period	12,199	
Coal to Stock for Period		171,764
Coal Available for Sale		171,764
Coal Sold at Mine	640	
Coal Sold and Shipped	171,124	
		171,764

TEMISKAMING MINING COMPANY.

Profit and Loss Statement For Eighteen Months Ended June 30th, 1921..

Production:			
Ore Sales			$271,330
Less:			
Ore on Hand December 31st, 1919.		92,035	
			$179,294
Costs:			
Development and Exploration	$ 31,828		
Mining	162,137		
Milling	84,166		
Shipping and Marketing	8,380		
		286,513	
Administrative and General:			
General Expense, Mine Office	44,442		
Taxes, Insurance and General Expense	35,582		
		80,025	
			366,539
			187,244
Miscellaneous Earnings:			
Interest, Discount and Exchange	49,049		
Miscellaneous	2,429		
			51,479
Deficit—Transferred to Surplus			$135,765

General Manager's Report.

Manager Gordon F. Dickson says in part:

The scheme of development and improvement in equipment of the Mine planned at the close of 1919, and warranted by the then existing price of silver was continued during the early months of 1920. In addition to opening up a sufficient quantity of ore to keep the mill running at a full capacity, a commencement was made to accumulate a reserve of broken ore in stopes of such grade as would insure a satisfactory margin of profit.

The maximum price of $1.32 per ounce was realized from shipments made in January but in February a downward trend began which continued through the year until, in October, the market quotation had reached such a low figure as to preclude profitable operation in view of the continued high cost of labor and supplies.

The general prevailing belief at first was that the drop in price of silver was temporary and that there would be an improvement later, so, to minimize the possibility of loss, the expenditure on exploration and development was at first curtailed but subsequently was stopped, the supply of ore for the mill during October and November being entirely from broken ore reserves.

In November the shortage of power due to the dry season also necessitated further reduction and these combined circumstances eventually compelled the [illegible] of the mine altogether.

[illegible] addition of this plant was decided upon in August the price of silver was 90 cents per ounce, but in November, when the mine had to be closed down through lack of power, the market value was further reduced to 70 cents per ounce. Even at this price the results of a number of practical tests showed a safe margin of profit available from the separate treatment of the tailings but it was considered preferable to suspend this work until this spring, when with sufficient power to continue operations in the mine and keep the mill supplied, there would be enhanced profit. The continued fall in the price of silver to the low mark of 58 cents, however, left the question of profit from mining operations so much in doubt that the property has remained idle to the present.

The following is a summary of the Development work accomplished during the year:—

Drifting	573′
Cross-cutting	377′
Raising	366′
	1,316′

The chief sources of supply of ore were as follows:—

From No. 2 and No. 3 Veins, 200′ Level	21,850 tons
D Vein, 400′ Level	967 tons
No. 6 North, No. 2 and No. 1 South Veins, 500′ Level	3,510 tons
No. 1 South, No. 6 North, No. 8 South, and No. 19 Veins, 575′ Level	9,493 tons
Total	35,820 tons

The Mill ran 80.47 percent of the possible running time during the year. The chief causes of stoppage were due to the shortage of water, time required for repair work and to the closing down of the Mine in November.

The necessary alterations were made to the Mill with the addition of one unit of the flotation plant for an estimated capacity of one hundred and twenty-five (125) tons per day. Almost the whole of the plant and material for the second unit are purchased and at the mine ready for erection. The lateness of the season and the necessity of suspending operations at the mine compelled the stoppage of the work of erecting the balance of the plant.

Notwithstanding the satisfactory results from development work, the complete establishment of economical methods of working as a result of alterations and improvements to the plant both of which enable keeping the mill supplied at full capacity, the unexpected fall and ultimately low price of silver prohibited the possibility of reopening the mine this spring for profitable working.

At the time the mine closed down through shortage of power in November of last year the price of silver was 70c. per ounce which was sufficient to leave a

margin of profit. The further fall since then to the neighborhood of 60c per ounce, would be barely sufficient, even with the increased extraction from the tailings plant, to allow of carrying on the necessary exploration and development work and the mine has, therefore, remained closed to the pres-

Semet-Solvay plants have been shut down for varying

Shut Down of Coke Ovens

By J. M. HASTINGS, Jr.
(From "Iron Age".)

The impression seems to have gained considerable credence that a by-product coke-oven plant cannot be allowed to become cold without serious consequences and more or less complete rebuilding before it can be started again. Some owners are even going to heavy expense to keep their oven plants hot, or are selling coke at a serious loss to avoid a shut-down. A report recently received from a plant of by-product ovens near Wheeling, W. Va., shows that a correctly designed plant may be shut down completely without serious injury.

In 1918 a plant of 60 Semet-Solvay ovens was built for the Riverside Iron Works, now owned by the National Tube Co. at Benwood, W. Va., just outside of Wheeling. Two years later 60 more ovens were added. The plant was built on the flat land along the Ohio River, and although the records of high water were carefully studied for a long period, the progressive denudation of the forests made these records of little value, and three years after the first ovens were started the plant was put out of operation by high water. During the twenty years from April 24, 1901, when this first shut-down occurred, to March 16, 1921, the date of the most recent shut-down, the Benwood coke oven plant has been closed down and started up again twenty distinct times.

Seven times in that period the Ohio has flooded the district and effectively put the ovens out of commission. Most of these interruptions were for relatively short periods, although in each case the plant was kept in operation until water entered the waste heat flues. In March, 1907, however, flood water was high enough to enter the sole flues and reach the oven floors proper, causing an 18-day shut-down, and in April, 1913, the worst flood in the history of the river brought the water into the lower heating flues 15 in. above the floor of the ovens. On this latter occasion a shut-down of 25 days resulted, largely because natural gas for starting up again was not available for some time after the flood subsided.

In addition to interruptions caused by floods, the plant has been down four times on account of coal shortage, twice for repairs to the hydraulic mains and seven times on account of business conditions. Duration of shut-downs from this last cause has ranged from one month in 1914 to a year and seven months in 1907 to 1909.

During its entire twenty-two and a half years' existence, the Benwood plant has been shut down 1958 days, or a total of 5-1/3 years up to March 16 of this year, since which date it has again been cold. Several other construction of this type of oven, with the well-known strong division wall between the ovens, was so substantial that any injury occasioned by these vicissitudes has been of a minor nature, as is shown by the following records.

Of all the ovens built in the United States, No.30 oven in block No. 1 at Benwood, holds the record for low repair costs. This oven has been in operation 17 years and out of running 20 times for a total of over five years, and to date has required no replacements whatever in its lining or brickwork. No. 60 oven in block No. 2 is a close second, having required less than $20 expense for brickwork repairs. It should be further noted that the two ovens mentioned at Benwood are both end ovens, which is the point where injury to the structure of the blocks often first appears. The repair records of these two ovens are of course exceptional, but the record of the entire plant has been remarkable, despite the numerous interruptions.

In addition to these repair records on the ovens, the yields obtained at the Benwood plant have been very satisfactory and compare favorably with those from the best modern plants. For the five-year period from Jan. 1, 1915, to Jan. 1, 1920, during which time the plant enjoyed fairly continuous operation, the average results were as follows:

Analysis of Coal Charged.

Volatile	29.9 per cent
Fixed carbon	62.2 per cent
Ash	7.9 per cent

Yields Obtained

Total coke	78.2 per cent
Sulphate of ammonia	24.5 lb. per ton
Light oil	3.11 gal. per ton
Tar	10.0 gal. per ton

These records show conclusively that that plant has not suffered by reason of its many shut-downs and the same should be true for any correctly designed oven plant. Of course it is necessary to exercise care and to take certain precautions when closing down a coke oven plant for an indefinite period. The process is, in general, just the reverse of that employed in starting up a block. The heats should be lowered gradually by a gradual reduction in the supply of fuel gas, so that the contraction of the block will take place slowly and regularly. As this contraction progresses, the tie rods should be readjusted and a close watch maintained to guard against cracks developing.

If the coke is left in the ovens, as is sometimes done when a long shut-down is not anticipated, the greatest care must be used in sealing the ovens as nearly air-tight as possible. The door frames must be kept tight against the brickwork uptake pipes maintained in proper position and charging hole covers sealed tight. With an experienced operator in charge there is no reason why a block of ovens of correct design cannot be shut down for a longer or shorter period, without extraordinary labor or heavy repair expense on starting up.

Dr. WALLACE RETIRES FROM COMMISSIONERSHIP OF NORTHERN MANITOBA.

By REECE H. HAGUE, The Pas, Man.

No permanent appointment of a successor to Dr. R. C. Wallace, whose term as Commissioner for Northern Manitoba expired on September 31st, has yet been made.

Mr. J. A. Campbell, M.P., is temporarily acting as administrator of New Manitoba, but the Provincial Treasurer for Manitoba, Hon. Edward Brown, has stated that Mr. Campbell consented to act for only three months in order to give the government an opportunity of finding a permanent encumbent for the offiee.

The people of the north have received an assurance that the prestige of the office of Commissioner of Northern Manitoba will not be lowered when the question of a successor to Dr. Wallace is decided. The government has several men in view, all of whom are of reeognized geological attainments.

Deep regret is felt in the north at Doctor Wallace's departure, but attempts to induee the retiring eommissioner to secure a further leave of absence from the Manitoba University were unavailing. Three years ago Dr. Wallace was loaned by the University for two years to act as administrator of New Manitoba, and as a result of a deputation of citizens of the north to the Board of Governors of the University, last year, his leave was extended. It was the desire of the people of Northern Manitoba to ask this year for a further extension of leave, but Dr. Wallace was adamant in his decision to return to the University and earry on with his work there as Professor of Mineralogy and Geology.

During his term as Commissioner of Northern Manitoba Dr. Wallace has done invaluable work for the mining industry of the distriet north of The Pas. Coming straight from a University chair it was hardly to be expected that he would display the administrative ability which has been so pronounced a factor of his work in the north.

Scholar and Man of Affairs.

It is a fact that men of academic attainments are frequently lacking in business acumen, but this has by no means been the case with Dr. Wallace, who has handled the affairs of the north wisely and well and interested himself with considerable success, in every matter, large or small, appertaining to the welfare of the tremendous area over which he has had control.

Dr. Wallace's efforts have not been confined exclusively to the mineral aspect of Northern Manitoba, but this phase of his duties has taken up no small part of his time. During his sojourn as Commissioner he has visited every property of merit in his territory and given every assistance to those desiring it, from the mining magnate to the most humble prospector.

In his official capacity Dr. Wallace has attended and addressed gatherings of the flower of the mining life of Canada and has never failed to impress his audience with his remarkable grasp of the subjects which he discussed.

Confined to the narrower sphere of the University it would have taken Dr. Wallace many years to achieve the reputation which the last three years in a larger field have gained for him.

To a certain extent it is the opportunity which makes the man, but there are few men who could have grasped their opportunity in the whole hearted and competent way which has been so noticeable in Dr. Wallace.

The retiring Commissioner has left the north with the goodwill of every citizen of the territory and there was hardly a man in the 178,000 square miles which comprise Northern Manitoba, who did not heave a sigh of regret when he realized that his friend and guide was leaving the district.

As a token of their appreciation of his services the residents of the north tendered a farewell picnic to Dr. Wallace on the eve of his departure for Winnipeg, at which he was the recipient of a large case of silver and an illuminated address, in the course of which the people of New Manitoba attempted to give the departing geologist some idea of the esteem in which he was held.

His Faith in Northern Manitoba.

In the address special stress was laid upon the work done by Dr. Wallace to further the mining industry in Northern Manitoba and in the course of his farewell message Dr. Wallace assured the citizens of Northern Manitoba that he would continue to work for the future of the country with every means in his power and would take the opportunity of again visiting The Pas mineral belt as opportunity offered.

Dr. Wallace expressed unbounded confidence in the future of Northern Manitoba and said that it was a matter of great encouragement that the important mining centres and mining capital now looked so favorably on the district of New Manitoba. The results would be felt, he was sure, as soon as economic conditions began to improve.

"The Flin Flon property and the district are firmly established," said Dr. Wallace, "and what could not take place in 1921 will most assuredly take place when economic conditions of the worlds business will permit. We may hazard the guess that this will be within the next two years. In the meantime the financing of our gold industry is finally taking a stronger tone, and Herb lake should witness real industrial progress next year; and that progress will, we trust, extend westwards across the belt."

The speaker contended that, in order to co-ordinate the various phases of northern industrial life, a concerted effort must be made to assist the project of developing power at the Whitemud falls on the Nelson river, transmitting through the whole of the mineral belt.

Nothing, he said, would more rapidly stimulate the Northern Manitoba gold industry than the assurance that power would be available from this transmission line at practically any point on the whole belt.

Dealing with the question of securing capital for feasible development projects in the north, Dr. Wallace maintained that as far as mining was concerned the wisest policy was to elicit the interest of the larger mining corporations of British Columbia, Ontario or the western States and to work through well established business organizations and eliminate the company which began with no capital at its back. When solid mining was successfully established there was then room for all companies, but not at the present time, he stated.

Wallace Barnes Company, Ltd., will start the manufacture of springs for the Canadian trade next month in their new factory at Hamilton, Ont., which will be under the management of Mr. T. M. Norton. The parent company is the Bristol, Conn.

British Columbia Letter

Dawson.—The 25th anniversary of the discovery of gold in the Klondyke was celebrated on August 17th last. Sourdoughs from all over the territory gathered at Dawson for re-union and convivial observations of the occasion.

Stewart B.C.—The Fish Creek Mining Company has made a trial shipment of 20 tons of ore valued from $500 to $600 a ton. The development of the Idaho group of mineral claims on the Marmouth River is proceeding with good results. New ore has been broken into, samples of which show splendid values on assay. There are eight claims in the property which is situated on the north fork of the Marmot about six miles from tidewater. The first shipment of concentrates from the Premier Mine, Salmon River was made a few weeks ago. It consisted of 160 tons estimated as being worth about $1750.00 a ton. A trial shipment of from two or three tons of ore is to be made from the Silver Bar property situated on Salmon River. The Silverado Mining property, Portland Canal District has been acquired by a syndicate headed by J. J. Coughlin of Vancouver. This prospect is situated on the west side of Portland Canal opposite the mouth of Bear River and the town of Stewart. The new owners intend building a light tramway from the showings which are at an elevation of about 4200 feet down to 2200 foot level. From this point a trail will be built to tidewater. The plans also include the construction of a permanent camp in order that actual mining and necessary development may be continued during the winter.

Alice Arm B.C.—The North Star has made a shipment of ninety tons to the Smelter at Anyox. As development proceeds this property increases in promise and there are indications that it will become one of the regular shippers of the district. There is a compressor at the mine and other mine equipment. Action has been brought against the Taylor Engineering Company in the Supreme Court of British Columbia by George Wingfield of Reno, Nevada, for the recovery of $182,322.00. This money it is alleged is owing to Mr. Wingfield and his associates by the Company on account of liabilities undertaken when the Dolly Varden Mine came into the possession of the Company. It will be recalled that the Provincial Legislature Company subscribed itself. One of these was the payment of $150,000.00 which it now is claimed has never been paid. The difference between that amount and the amount sought through the Courts consists of interest. Considerable interest is taken locally in recent developments on the Toric group of mineral claims, Kitsault River. A body of ore is said to have been opened up that is as rich as any found in the district. The Toric is situated on the Dolly Varden railroad grade and not far from that mine. While the development has not advanced far enough to permit an estimate of the tonnage of this ore the indications certainly are gratifying and the optimism that has resulted among the mining men interested in the district would seem to be justified. The claim is made that it now is demonstrated that the richness of ore of the Dolly Varden will be repeated in other mining properties in the same locality and that all that is necessary is systematic and thorough exploration.

Anyox B.C.—The question was recently put before the workmen of the Granby Consolidated Mining & Smelting Company as to whether that company's plant at Anyox should close down or a reduction in wages be put into effect. There was a vote taken on the issue by the men, the result being a very substantial majority in favour of the continuance of work. The copper smelter of this Company therefore will remain in blast at least for the present.

Cranbrook B.C.—The project for the meeting at Cranbrook of members of the American Institute of Mining and Metallurgical Engineers and of the Canadian Institute of Mining and Metallurgy has been abandoned. It was proposed by the British Columbia Prespectors' Association that while the American Engineers were in the west they should be invited to the Kootenay Section of this Province in order to become acquainted with the larger mining enterprises of that country and and to obtain a closer knowledge of the problems of mining operators and prospectors not only in British Columbia but as well in the States of Washington, Montana and Idaho. The response to the invitation, however, does not appear to have been sufficiently satisfactory to warrant the attempt to carry out the programme that the Prospectors' Association had in mind. Much is expected in East Kootenay of the Federal Mining Company which for the first time has entered that field having bonded the Stemwinder property near the Sullivan Mine. This Company plans to start diamond drilling in the hill, operations of which will be continued through the winter. It is reported that the same Company has acquired the North Star Mine and is interested also in other properties in the same section.

Trail, B.C.—Reductions in freight rates and indications of reductions in treatment and refining charges are bringing closer the revival of mining among independent operators in the Slocan and other Kootenay Districts. The Bunker Hill Smelter recently reduced its treatment charges on British Columbia lead ores $1.00 per ton. With an assurance of a reduction in the freight rates on ore and concentrates from Slocan points to Bradley, Idaho, the same to become effective on or before September 15th, and with the reduction already effective on freight rates between Bradley and the Atlantic seaboard. It is estimated that the total charge against British Columbia lead ores will be reduced $4.55 per ton. This it is hoped is but the beginning. Those interested are looking for further developments not only in respect of the cost but also in regard to the improvement of market quotations. Pending an improvement in the prices of lead, silver and zinc the Rambler-Cariboo Mines, Ltd. has decided to suspend all work. While production has been at a standstill recently, some men have been engaged on development work.

Nelson B.C.—The Reno property, Sheep Creek, is showing up very satisfactorily, according to the management of the Reno Gold Mine. Mr. R. Leahy, Manager of the Mansfield Mining Co., and owner of the Horn Lead Group of 6 claims, Lardeau Creek, reports that development is continuing with good results on the former property. A crosscut is being driven to tap the main vein at depth. Assays show values in gold and silver. Mr. Leahy states that the Silver Cup Mine which has made several shipments recently to the Trail Smelter has struck a vein of Galena ore, averaging $150.00 a ton. Placer mining is being revived on the Lardeau River by a veteran prospector, Dan Savoy. Savoy is constructing sluice boxes on tested ground capable of yielding it is said $5.00 a yard. If the ground maintains $1.00 a yard Mr. Savoy declares that

he and his associates will equip a dredge and instal other up to date machinery. The Mountain Chief Mine, an old shipper is being re-opened.

Revelstoke B.C.—A strike of silver lead ore on the noble Five Group, Trout Lake District, is reported. A large sample of the ore has been brought in averaging $200.00 to the ton. The body just uncovered is said to be substantial and the result no doubt will be renewed activity in the development of this property. Mike Penrose, an old time prospector, claims to have discovered on Canon Creek a few miles to the south of the town of Golden, a vein of free milling gold 25 feet in width which he traced 6000 feet. There is no report yet as to the assay returns on his samples.

Victoria B.C.—The report of J. D. MacKenzie of the Canadian Geological Survey on the limonite deposits of the Taseko Valley, B.C. has been published. Mr. Mackenzie confirms the findings of J. F. Crossland who in 1920 conducted an exploratory party into the district on behalf of the Provincial Government. It was found that the deposits were not of sufficient importance to warrant development. The total tonnage is placed by Mr. MacKenzie at 669,350. There are several deposits of varying quantity. The deposits consist of brown limonite of varying shape, size and thickness, built up of thin layers of brown, cellular, and generally loose textured limonite, lying parallel to the surface of the ground on which they rest. The limonite when dug, forms a large percentage of fines, most of it breaking into pieces of less than half an inch, and much of it breaking into the fineness of sand. The iron is derived from finely divided pyrite, which impregnates greatly silicified and sericitized tuffs on the Taseko formation. The iron sulphate solutions formed by the oxidation and leaching of this pyrite trickle down the mountain slopes and deposit at the first favorable location, building up a bed of limonite.

Field observation was sufficient to determine that replacement of organic matter, which played such a large part in the deposition of the Zymoetz limonite (Northern B.C.) is here of negligible importance and no certain instance of it was observed. The occurrence of considerable quantities of wood in the form of branches and twigs in certain zones often deep in the limonite and quite unaltered except for a blackening of the outer layers is evidence that the iron solutions are not of a nature to replace vegetable matter with limonite. The report of considerable length, is illustrated with maps and diagrams. Mr. MacKenzie also contributes to the geological survey publication, covering 1920, an article entitled "A reconnaissance between Taseko Lake and the Fraser River." On that trip the remains of an old volcano were encountered near the head of Relay Creek in the Lillooet district and the formation of the surrounding country showed traces of volcanic origin.

Other reports are made by W. E. Cockfield on the silver-lead deposits of the Keno Hill area; S. J. Schofield and George Hanson on the Salmon River district; V. Dolmage on the west coast of Vancouver Island; C. E. Cairnes on the Coquahalla area; R. W. Brock on the Eutsuk Lake district; and M. F. Bancroft on the Lardeau map area.

Regarding the Eutsuk Lake district Mr. Brock after referring to the possibilities of the district in general discusses the plateau, a feature of this part of central British Columbia, in the following terms. "It is true that no important mineralization was observed above the instrusives near Ootsa Lake, but in some cases the easily replaceable tuffs on the porphyrite series will certainly be found near the contact of the intrusives and are likely to be mineralized. Northeast of the railway, toward Babine Lake, promising deposits have been found, and from what was seen of the geological conditions of the country to the southwest of it, it is reasonable to expect this experience to be repeated. A possible difficulty in the way of prospecting may be to find sufficient outcrops away from the intrusive itself."

Doctor Victor Dolmage whose work last year was in the west coast district of Vancouver Island, refers to a large deposit of marble at Deserted Creek and Tarsis Canal. It has a thickness of several thousand feet and outcrop over a distance of more than a mile. The marble is coarsely grained and varies in color from pure white through shades of grey to black. In 1908 the Nootka Quarries Co. quarried marble at this point, and produced and sold some $3000 worth of stone. After this the plant was closed, and no work has been done on the property since. Presumably the operations were not financially successful. The company clearly demonstrated that the marble could be quarried in large blocks, free from flaws, and that it could be sawn, turned and polished, and was in every way suited for ornamental and building purposes. It is possible that the development of the property was a little ahead of the demand, and that in the near future so valuable a deposit of marble may receive the recognition that it undoubtedly deserves. He concludes his report with a reference to the alunite deposit at Kynquot Sound. Alunite from this district, according to analysis by five independent chemists of samples taken by W. M. Brewer and P. B. Freeland at the investigation of the Minister of Mines, contains only about 2.6 per cent of water-soluble potash, which is far too small a quantity to be of commercial value. To be profitable for the production of potash it is necessary that alunite should contain not less than 9 per cent of water-soluble potash, and it is doubtful under present conditions whether even that quantity would pay the cost of extraction and refining. Dr. W. H. Collins, Director of the Canadian Geological Survey visited British Columbia a few weeks ago. This was his first official trip through the Canadian West since his appointment to the position. He defined the object of the work of the Geological Survey in this Province as being, first to make base maps of the country that can be used for all sorts of purposes; second to aid prospectors in locating mineral discoveries; third where such discoveries are made and are found to be of sufficient importance to investigate them and thus aid in their exploitation. Dr. Collins made a tour of Vancouver Island the lower mainland of the Province and has gone to Prince Rupert on his way east. There have been many and varied ingenious expediences tried out, some with success and others fortunately without such results in the effort to obtain money illegitimately by the appeal of alleged gold mines. One of the most flagrant instances of this has recently come to light. Evidently it has its genesis in New York and Chicago. A prospectus indicates that the Promoter proposes to sell gold to those who invest for future delivery at $4.50 an ounce. He states that refined gold is worth $20.67 at the mint and unrefined gold worth $18.00. It would appear that the authors of this scheme take the position that they are selling the gold in the ground at $4.50 and can afford to de-

liver it at the standard figure when sufficient capital is obtained to develop the property. The truth, however, is that no such Company as is named has placer leases in British Columbia, nor is there any such Company incorporated under the laws of this Province. Apart, therefore, from the fantastic nature of the project it is clear that the whole thing is nothing but an unmitigated fraud designed to filch the innocent among the public. John A. Dresser, Consulting Mining Geologist of Montreal, has left for the Peace River District on behalf of the British Columbia Government. He will visit the scene of oil drilling operations near Hudson's Hope. This well now has reached a depth of 800 feet.

The collieries of Vancouver Island are working practically at full time. The domestic market is improving with the approach of winter. There is a strong demand from the State of Washington where the coal mines are producing but little. With both local and foreign trade brisk the prospect is that the British Columbia mines will be worked to capacity at least for the next six months. Already there is a suggestion that a coal shortage is likely to develop in the northwest and consumers are being advised to make their purchases without delay.

Under the laws of British Columbia the Collieries are required to pay wages in fortnightly periods. The Pacific Coast Coal Mines Ltd., operating on Vancouver Island and which ceased work some months ago owing to financial difficulties, was guilty of a breach of this statute. Recently action was taken against the company through the Courts on behalf of twenty men whose wages were not paid within the time limit defined by legislation. Judgment was secured and the Company fined $25 in respect of each employee named, or a total of $500. It is said that the case will be appealed.

A coal mine situated near Cenaralia Wn. has reopened on a co-operative basis. The men have been given shares in the Company. They have gone back to work. Elsewhere in the State there is little or no coal mining for the domestic market. The U.M.W. of A. has refused to accept proposed reductions in wages and the Operators have announced that they will open open the mine on the "open shop" basis.

Diamond drilling is in progress on the Chu Chua coal deposits near Kamloops B.C. The purpose is to thoroughly explore the field and, if warranted, to make the investment necessary for further development.

Officials and employees of the different Collieries of Vancouver Island were well represented at the Annual First Aid and Mine Rescue Competitions held on Labor Day at Cumberland B.C. All events were well contested and both in First Aid and Mine Rescue Work the efficiency of the Competitors was the subject of favorable coment on the part of the judges.

The complete results follow:

Mine Rescue Competition, six entries: First prize, shield and six gold watches, won by Cumberland, William Gallis, captain; L. Francesini, Jonathan Taylor, William Evans and A. Watson; second prize, six gold watches, won by Nanaimo, R. Laird, captain; C. Parkinson, J. Sutherland, F. John, A. Courtenay and J. Hodgson.

Department of Mines Cup and Gold Medals, eight entries: Won by No. Four underground team, Cumberland, Wm. Beveridge, captain; Jonathan Taylor, R. Reid, L. Francescini, J. Williams; second prize, gold medals, won by No. Four surface team, Cumberland, A. J. Taylor, captain; J. A. Quinn, H. Boffy, J. G. Lockhart, C. Nash.

Coulson Cup and Medals, eight entries: First, Simpson's team, Nanaimo; second, McLauchlan's team, Granby. Cumberland No. Four underground ran a close third.

Two Men Events, seven entries. First prize, gold rings, won by Quinn and Lockhart Taylor, Cumberland; second, Simpson and Thorpe, Nanaimo.

One Man Event, eight entries: First prize gold rings, won by Beveridge and Reid, Cumberland: second, Kay and Thorpe, Nanaimo.

Ladies' First Aid Event, three entries: First prize $25, won by Mrs. Nicholls, captain; Mrs. Tait, Mrs. Scott, Mrs. Carnelly and Mrs. J. Swan: second prize, $15, won by Mrs. Douglas, captain; Miss McGarrigle, Miss James, Mrs. Davis and Mrs. Witsworth. All teams come from Nanaimo.

Junior Cup, three entries; First prize, Nanaimo team: second prize, won by Ladysmith.

Northern Ontario Letter

THE SILVER MINES.

The assertions recently made by the Journal that a number of the mines in the Cobalt district are on the verge of conditions which offer promise of a general resumption of operations are borne out in the annual statement of the Temiskaming Mining Company which has just been issued. The statement says, in part:

"At the time the mine was closed down through shortage of power in November last year the price of silver was 70 cents per ounce which was sufficient to leave a margin of profit. The further fall since then to the neighborhood of 60 cents per ounce would be barely sufficient, even with the increased extraction from the tailings plant, to allow of carrying on the necessary exploration and development work, and the mine has therefor remained closed to the present. The likelihood of discovering any quantity of high-grade ore in the old workings is small but there is scope for opening up a considerable tonnage of medium grade ore which, under the late improved conditions of working, would show a reasonably good profit with silver at 70 cents per ounce."

With regard to this, it should be pointed out that a wage reduction of 15 p.c. went into force since the Temiskaming closed down and that the abundance of labor now available has greatly increased working efficiency and has reduced operating costs very considerably at the producing mines. It is considered not improbable that such mines as the Temiskaming, Beaver Consolidated and McKinley-Darragh could operate profitably, even at the present price of silver, provided there was the assurance that the price would not recede, and provided further that another wage reduction of 15 p.c. could be arranged.

Bailey.

Total gross earnings from the Customs Mill of the Bailey Silver Mines amounted to 13,179.20 during the month of August, according to official advice to the Journal. The mill treated 4,296.40 tons of ore, the increase being 200 tons above the July record and the increase in gross earnings being over $1,000. The Bailey Mine itself shipped 1,360.12 tons of ore to the mill, this

being an increase of nearly 100 tons over the July record. With respect to development work on the Bailey it is learned that results at the 4th sub-level are favorable and that a substantial quantity of 23-ounce ore has been opened up in which a pay-streak of about two inches of high-grade ore occurs.

Elstone-Duncan.

Reports that the Coniagas had purchased control of the Elstone-Duncan property in the township of Gauthier have no basis in fact, according to information obtained by the Journal representative after making careful inquiry.

La Rose.

Recent developments at a depth of 570 feet on the Violet property of the La Rose are such as to encourage the hope that this property may share to some extent in similar conditions existing on the adjoining O'Brien mine where a large amount of high-grade ore occurs. The vein at the 570-ft. level is said to be from six to nine inches in width and is the downward continuation of a vein which contained good ore at a depth of 370 feet. It is understood the output from the La Rose properties for the current year will be the highest for some years and that a substantial margin of net profit will be shown.

THE GOLD MINES.

The Porcupine District.

For their size, there are perhaps no other industrial centers which show such great activity in any part of Canada as do the towns which lie in the midst of the gold mining activity of Northern Ontario. Porcupine and Kirkland Lake are names which are now firmly fixed in the minds of mining men, and the steady growth of the mines constitutes the keynote to general construction.

People are flooding into Timmins and Kirkland Lake at a rate which has taxed the housing accommodation to its full limit. In Timmins, especially, the big town is actually over-flowing with population, and each train coming in is carrying a human cargo which experiences diffienlty in finding accommodation.

In spite of the gold mines of Porcupine having been compelled through power shortage to operate at only about half capacity for the first four months of this year, the gold output for the first half of the year is the highest in the history of the camp. This also holds true of Kirkland Lake.

A fact worthy of note is that the Dome treated an average of only 840 tons of ore daily, or actually at a rate of a little less than two-thirds of its proven capacity of 1,350 tons daily. This tends to show that a production of over $3,000,000 a year is in sight for the Dome, and net profits of between 20 and 30 p.c. annually appear to be assured.

Clifton-Porcupine.

The annual meeting of the Clifton-Porcupine is to be held this week in Toronto for the purpose of electing officers and directors for the ensuing year as well as dealing with whatever other business may be properly brought before the meeting. It is believed an arrangement may be made to get the property under operation within a reasonably short time.

West Dome.

In respect to the proposed merger between the West Dome Consolidated and the Dome Lake Mining and Milling Company, there are certain details which have up to the present thwarted the efforts of the promoters of the scheme. It is stated in usually well informed circles, however, that progress is being made.

THE KIRKLAND LAKE FIELD.

Wright-Hargreaves.

Some interesting information has been secured in connection with the Wright-Hargreaves mine. The mill on this property was first set in operation in May, and by the end of June had treated 8,156 tons of ore from which $103,518 was produced. This shows an average recovery of $12.69 per ton, and is regarded as a most remarkable achievement during the period of tuning up the equipment. Taking the premium on United States funds into consideration, the Wright-Hargreaves realized a gross income of $13.96 from each ton of ore treated during the first two months of operation. This corresponds with official intimation last spring that the ore would average about 15 per ton. The mill has a rated capacity of between 160 and 170 tons daily, but, after making liberal allowance for possible loss of time, the average may be conservatively figured on a basis of 150 tons daily and an income of $14 per ton, thus indicating a yearly income of $766,500.

There is every indication that this high average will be maintained for a number of years before it will become necessary to include low grade ore and bring the average down to around $15 per ton.

on and after September 15th the price of the treasury shares will be increased to 40 cents each, as compared with the former selling price of 25 cents.

Boston Creek Area.

A meeting of the directors of the Miller Independence was held at the mine late last week. The financial statement read by the secretary showed $50,000 had been raised through the sale of bonds, and that the company is in a position to carry out the full exploration program arranged some months ago. The general manager, W. E. Simpson outlined the result of work to date and referred to the outlook with confidence. The results of diamond drilling operations at the 500-ft. level are most encouraging.

MAMMOTH MINING EXHIBITION AT CHICAGO.

The twenty-fourth annual convention of the American Mining Congress and National Exposition of Mines and Mining Equipment will be held at the Coliseum, Chicago, from the 17th to 22nd October next, inclusive. This convention bids fair to excel in importance almost any previous convention of a great business organization. The program, under the direction of a committee representing all branches of the industry, wil be strictly confined to industrial problems vital to the industry—and to the public.

The Exposition will be the most notable exclusively mining show ever undertaken. The Government of the United States, Canada and Mexico—all countries in which mining is an industry of increasing importance—and all mining districts, including those producing

[illegible] Mining Journal to be represented by a booth of which Mr. H. W. Thompson, our Western Manager, will be in charge, and where all our friends and their friends will be heartily welcome. Any who may desire information

TORONTO MINING QUOTATIONS.

Quotations on Active Stocks on Standard Stock Exchange on 13th September, 1921.

Silver.	High.	Low.	Last.
Adanac Silver Mines, Ltd	½	½	½
Bailey	2¼	2	2¼
Beaver Consolidated	31	27	31
Crown Reserve	10	9½	10
La Rose	28	26	27
McKin.-Dar.-Savage	16	14	14
Mining Corp. of Can.	1.12	1.10	1.10
Nipissing	5.15	5.10	5.15
Temiskaming	24	24	24
Trethewey	11½	10½	11½
Gold.			
Atlas	15½	15	15
Dome Lake	9	8	8
Dome Mines	18.60	18.05	18.60
Gold Reef	2½	2¼	2½
Hollinger Cons.	7.40	7.35	7.39
Keora	8¼	7	7
Kirkland Lake	6	6	6
LaBelle Kirkland M.	38	38	38
Lake Shore M. Ltd.	1.28	1.26	1.27
McIntyre	2.05	1.93	1.93
Moneta	12	12	12
Porcupine Crown	17¾	16	17¾
Porcupine V.N.T.	19¾	18	19
Preston East Dome	2¾	2⅝	2¾
Teck-Hughes	17	15¼	15¼
West Tree Mines Ltd	4¾	4⅛	4¾
West Dome	8½	8⅛	8¼
Wasapika Gold M. Ltd	3⅛	3¼	5
Miscellaneous.			
Petrol Oil	21	20	20
Rockwood Oil, Gas	1½	1	1

METAL QUOTATIONS

Following are the fair average prices for ingot metals (in less than car-loads):

Toronto.	Cents per lb. 14th Sept. (Unchanged since last week.)
Copper, electric	17
Copper, casting	16¾
Tin	35
Lead	6¾
Zinc	7½
[illegible]	[illegible]
Aluminum	[illegible]
Antimony	[illegible]

C. P. R. EXTENSION TO DRUMHELLER.

One of the most important of the material developments of Alberta, in relation to the rest of Canada will says the Calgary Bureau of the Financial Times, be the completion of the C. P. R.'s extension to Drumheller—the big and convenient soft coal field—which D. C. Coleman, the manager of the Company's western lines, has announced will be completed by this autumn.

TORONTO COAL PRICES.

Toronto, 14th Sept.—There has been no change in coal prices since last writing. Slack still continues somewhat scarce. Dealers report that there are enquiries in plenty with regard to lump. The trouble of it is that comparatively few of these enquiries are, so far, leading to orders. The truth probably is that the enquiries themselves are mainly the result of a pretty energetic campaign of circularization on the part of the coal men. These latter, when circularizing, do not quote prices—many of them, at any rate, do not. Consequently, the parties circularized start making enquiries in the hope of being able to pick up some cheap coal to "get something for nothing," as the coal men put it. But when they find the price unaltered, there's "nothing doing."

MACKENZIE RIVER OIL FIELD.

The "New Oil Fields of Northern Canada" is the title of an interesting pamphlet on the Mackenzie District that has recently been issued by the Department of the Interior through its Natural Resources Intelligence Branch at Ottawa. The report contains a description of the area of the new district, a resume of progress and development, a synopsis of the regulations and other valuable information regarding routes of transportation, communication, climate, sources of supply, accommodation and such details.

A route map of the district accompanies the pamphlet which may be obtained free of charge, upon application to the Superintendent of the Natural Resources Intelligence Branch, Department of the Interior, Ottawa.

PORT ARTHUR MINING NOTES.

By J. J. O'CONNOR.

The executive, and fifty shareholders in the Palatine Mining & Development Company, visited Port Arthur on the 29th and 30th of August. The party came in in autos, over the Scott Highway from Duluth, Minn.

An inspection of the blast furnace and waterfront property of the company was made by the members, accompanied by Mayor Matthews and the city Aldermen, and a large party of prominent citizens.

They were entertained by drives about the city, and points of interest in this vicinity. On the evening of the 29th Mr. James Whalen gave a banquet at the Prince Arthur Hotel in their honour, which was largely attended by citizens. On the evening of the 30th President Mierziniki returned the compliment by inviting the citizens to a similar banquet at the Prince Arthur.

On both these occasions announcement was made by the members of the party, that it was their fixed intention to carry out extensive industrial development in this city, based on the iron and steel industry. The further announcement was made that they contemplated agricultural colonization on an extensive scale in this vicinity.

The party left by special train on the Canadian National Railway, on the morning of the 31st on a visit to the Paulson Mine, in Cook county, Minn. for the purpose of inspecting the mine, and ore lands under their control. They expect to return to Port Arthur on Sept. 5th.

The tunnel being driven to intersect the vein at the Jackson gold property, TB.3326 TB.3327 and TB.3354, situate two miles east of Schreiber, on the Canadian Pacific Railway has now reached its objective.

The vein where encountered is carrying very high values in gold. Tarpaulins and blankets are being used at every blast, in order to recover the whole of the shattered vein matter, all of which contains good gold values.

The success that has attended the development work at this property, is of the most encouraging kind, and gives promise of this prospect developing into a good producer.

Mr. Peter McKellar has just returned from a visit of inspection to the McKellar-Longworth mine, BJ.122, two miles south of Schreiber, where a new vein was uncovered on August 20th. The work of stripping and testing this vein is proceeding with the most satisfactory results. Good gold values are being obtained at every opening, the average of which, will easily place this vein in the high-grade class, is maintained.

Mr. McKellar is highly pleased with the developments on No. 1 vein, and together with the splendid results so far obtained on the latest discovery, feels that this property will give a good account of itself at an early date.

The option held by Clement K. Quinn on the Atikokan Iron Mine, has been allowed to lapse owing to financial stringency in the United States.

There is a well defined rumour current in Port Arthur, that the Palatine Mining & Development Company have purchased the Atikokan Mine, outright, and that the work of mining iron ore will be commenced when they are in readiness to operate their furnace.

FORD-BURNS COAL PROPERTIES.

An interesting rumor, to which publicity is given by the Calgary Bureau of the Financial Times, is to the effect that H. A. Ford, whose anthracite and bituminous coal properties in the Highwood River Valley, have been the objects of interests for the last ten years, has disposed of his interests to an American syndicate, which has in mind not only the development of Winnipeg, which has been the principal hard coal consumer of the western provinces, but also the briquetting process and the creosoting of ties, so much needed from Port Arthur west. It was currently believed that Ford and P. Burns would ultimately merge their interests and that control of these tremendous enterprises would remain vested in local hands as they are contiguous, and it may be that the new interests will combine with Burns and build a main road of steel up the Highwood River Valley and link up the deposits with the C. P. R. at Calgary or at Okotoks. With these properties working together, it is said that the cream of Alberta's coal products will be made available to the rest of the Dominion.

Mr. Bradley Stoughton, who until recently was Secretary of the A.I.M.E., has resumed his practice as a consulting engineer. He is making a specialty of Financial investigations and reports to bakers, investors, directors, trustees and examining accountants.

Mr. J. J. Warren, president of Consolidated Mining Smelting & Power Co., has returned from a trip to the Orient. His company's operations are chiefly in British Columbia. He crossed the Pacific in connection with the company's business in the Far East.

EDITORIAL

A SUCCESSFUL GOLD MINING COMPANY.

The summary of the report of McIntyre Porcupine Mines Ltd. which appears in this issue contains much information that will be interesting to a wider circle than the shareholders of the company. The tabulated record of results of operations since production began tells a story of mine making which is worth noting. The figures are especially illuminating to those who recall the early years of operations at the McIntyre; but of themselves, they show how the property has advanced from a little struggling enterprise to a big, well-established one that is about to expand into one of double the present size. The detailed reports of costs of mining and milling show that good work has been done during a period of abnormally high costs, and give reason for the conclusion that it will prove possible to mine much ore in the future, in addition to that which is at present classed as ore. The biggest item is shown to be labor, which cost $1.40 per ton, and this may be expected to be reduced as the cost of living comes down. The other large items will also doubtless show marked reduction in the coming year.

Of interest to the metallurgist is the statement concerning plant for treating carbonaceous ores. Mr. Ennis is evidently satisfied that the company has found a simple way to satisfactorily treat ores containing carbonaceous matter. The ore will be given a preliminary treatment in the mill circuit, which will put it in condition for cyanidation without danger of premature precipitation of gold. The additional 500 ton per day capacity will permit, by utilizing this process, the treatment of large quantities of ore which could not be satisfactorily handled by the present plant.

Perhaps the most interesting feature of the report is that which is devoted to results of development work. Perusal of paragraphs showing results obtained in this work will indicate why the company considers that the milling capacity should be doubled. The results of work at the 1,250 ft., 1,375 ft. and 1,500 ft. levels are particularly interesting and indicative of a big mine at and below those levels.

A BAD YEAR FOR THE PRODUCER.

Unusual interest is evidenced this year in reports of production and sales of minerals and metals. The failure of old markets and the scarcity of new ones, the groping for information that will give some clue as to future demands, the attempts to estimate how long the producer must be prepared to wait for good markets for base metals, the difficulties of financing established enterprises through the period of depression, the scarcity of money for new enterprises, the discouraging reports on conditions in other countries, and many expressed hopes and fears leave one's mind in a muddle, at a time when we should all be particularly alert and ready to act promptly when the proper moment arrives. Under the circumstances, it would appear to be more than usually worth while to keep oneself informed as to the facts that are ascertainable relative to the conditions that exist in the industry here in Canada and also in the other countries where mining is a big industry and in those countries where the products of our mines may be consumed.

Most of us are well aware of the fact that it is at present almost impossible to market large quantities of the base metals at a price which will pay for their production. Just how seriously this condition has affected the several branches of the industry is reflected in the record of production this year. Previous records of production did not so well reflect conditions because of the boom market which followed the war and the failure to recognize soon enough that the market could not absorb the product. Mounting costs had made profitable mining impossible, in many cases, long before production was cut down to meet the demand.

Any doubt as to conditions will be removed by noting that our metal production for the first half of this year

was only $24,264,423, as compared with $75,737,472 in the corresponding period of last year. It is worth noting, too, that the depression has affected the various metals in markedly different degree. Gold is being produced in larger quantity than last year, and gold mining is really active. Lead found a fairly good market at a lower price. Zinc also was marketed fairly well. Copper was difficult to sell even at low prices. Nickel and cobalt were almost unsaleable.

While metal mining has fallen off seriously, coal production during the half year does not show such a bad record. Petroleum production is about the same as in the previous year, the small quantity being the result of lack of developed oil fields, imports of petroleum being larger than last year. The asbestos industry is feeling the results of business depression in the United States, and is naturally dependent on activity in the building trades.

The story of production during the first half of the year is not one which fairly shows Canada's ability to produce minerals. It does not adequately illustrate the extent to which our mines are developed and equipped. It does, however, show what we were able to produce with a reasonable chance of selling, and it gives some idea of what we are likely to produce during the next few months. Some of our mines were operated, last year, for several months, when they might better have been idle, owing to hopes that markets would improve. In the United States, also, there was heavy accumulation of metals, partly owing to unfulfilled hopes and partly owing to unwillingness of operators to dismiss employees until such action became imperative.

The mining industry is not especially unfortunate at the present time; but its condition is of most particular concern to readers of this Journal. The reports of production and the reports of poor markets are not very pleasant reading, but it would be folly to ignore them. Believing that we can get into a better position more quickly by taking prompt advantage of improved conditions, we have to know the ascertainable facts even if they make dull reading. The preparation of this report by the Dominion Bureau of Statistics is therefore considered very commendable.

SHOW MINING MACHINERY IN OPERATION.

At the National Exposition the National Railway's big locomotive was critically examined by boys who clambered all over it. Why not let the boys have a chance to run a machine drill, watch a diamond drill bit setter at work, have a ride in a train car hauled by an electric or gasoline locomotive, ride in a mine cage, watch a battery of stamps and ball and pebble mills in operation breaking ore?

An exhibition of mining and milling machinery in operation would help our people to appreciate that mining is an industry requiring skill and energy. Most people have only a very hazy idea of mining operations and it would be worth while to educate them to a better understanding of one of the real productive industries of our country.

The "Northern Miner" remarks that the exhibits which attract are those in motion and making a noise. Can you think of anything more suitable than a battery of stamps? A ball mill would perhaps be less objectionable than the stamps, but not of as much educational value, unless made of glass, like Mr. Hardinge's little models.

FUTURE FUEL SUPPLY OF CANADA.

An official report of evidence taken during the Session of 1921 by a Special Committee of the House of Commons, which made enquiry into the future fuel supply of Canada, has been printed. It is a voluminous report of seven hundred and eighty pages, and in it appear statements by many who are interested in the coal mining industry. The committee held 26 sessions and examined 37 witnesses well known in the industry. Among those who gave evidence, were Hon. L. J. Cote, Minister of Mines of Alberta, Professor N. C. Pitcher, of Alberta University, R. M. Young, secretary Western Coal Operators, L. E. Drummond, of Edmonton, J. Dougall of the C. P. R., Roy M. Wolvin, president Dominion Steel Corporation, Alex. Dick, sales agent D.S.C., D. McLennan, D. H. McDougall, President of Nova Scotia Steel & Coal Co., R. Baxter and J. R. McLachlan and W. P. Delaney, Labor representative of Glace Bay, I. D. McDougall of Inverness, J. G. Scott, British Columbia Coal Co., Hon. J. E. Michaud of New Brunswick, H. A. Harrington of Toronto, J. M. Daly of London, B. A. Caspell of Bradford, Wm. J. Halpin, of Ottawa, J. M. Harcombe, Ottawa, Louis Simpson, of Ottawa, Alfred Rogers, of Toronto, and J. G. P. Hudson of the Department of Mines.

After hearing these and several other persons the Committee made several recommendations to the House. Among these were: that a Government officer be appointed to keep in close touch with the fuel situation; that our water powers be developed to the greatest possible extent; that railways be electrified in certain districts; that efforts be made to reduce the cost of transportation by water; that people be encouraged to use domestic fuels, instead of imported anthracite; that consumers be urged to buy coal in summer; that operators be urged to produce and store large quantities of coal at certain points; and that a campaign of publicity be maintained for the purpose of encouraging people to use domestic coal.

The recommendations are such as might have been expected, the reason for them being more or less obvious without special enquiry. The book of evidence may form the basis for conclusions which will be a real help in solving the problem. The Committee did good work in getting the evidence. Someone else will have to make use of it, if it is to prove worth the trouble involved.

EDITORIAL NOTES.

The metal production of Canada during the first six months of this year had an estimated value of $24,264,423. This is only a fair output for Ontario alone. The metal production of Ontario during the first six months of 1920 was $22,101,580.

The market for silver appears to be livelier. Coupled with the good results being obtained at Cobalt the prospects of the silver mines now look brighter than for some time.

According to the "Northern Miner", Hon. Harry Mills has not failed to notice what a poor representation is made of the mining industry at the National Exposition. Mr. Mills' suggestion that a mining building, having the shape of a shaft house, be erected for mining machinery exhibits, is a good one. Every youngster who visits the fair should have an opportunity to see and explore a "mining building" that houses a creditable exhibit.

An article by the Editor of "Northern Miner," in the issue of September 17th, describes gold deposits at Lightning River as being very promising. This area is some distance from the railway, but as there is easy access by water it should not fail to attract attention. The description of properties visited by Mr. Pearce will be found well worth perusal.

According to "Mining & Scientific Press" the recorded testimony, briefs, arguments and decisions in the several froth-flotation patent suits in the various courts of the United States exceed 15,000,000 words. There will probably be a few million more before a clear definition of the scope of the patents is arrived at. It is unfortunate that the mining industry has had to spend so much money on this litigation. The metallurgists who devised the process made a big contribution to the industry, but the costly patent litigation has, to a large extent, nullified the value of the process to the industry.

Those who are anxious to tax mining companies when they are making large profits, show little interest in the same companies during periods of stress. That a mining company should be allowed to make as large profits as possible is illustrated by the present position of Anaconda Copper Mining Co. This company is disbursing $500,000 per month while its mines are closed down. It is keeping 2,600 men employed. Anaconda has big assets and can keep the property in readiness for business.

ROD MILL AT HOLLINGER.

It is reported from Timmins that a rod mill is now in operation at the Hollinger mine.

HARDINGE COMPANY REVISES SECTION 1 OF ITS No. 7 CATALOGUE.

Owing to the large demand for literature, the Hardinge Company, of 120 Broadway, New York, has found it necessary to revise section 1 of its No. 7 catalogue, which is now available. This section deals with the principle of operation of the Hardinge conical mill; and gives a general description of its uses in the industrial, mining and special fields. Those wishing copies should state in what class of grinding they are interested, in order that they may receive information dealing with their particular requirements.

It may be mentioned that Mr. H. W. Hardinge, a consulting engineer of thirty-eight years' experience, first introduced the conical mill in the field of grinding for the concentration of ores. Since the time the mill was first introduced, it has effected economies in almost every field in which grinding is being undertaken. The reason for the wide range of uses is due to the extreme flexibility of operation, coupled with the fact that the mill lends itself well to working in combination with other devices which aid in obtaining a product conforming to the specifications.

Among the materials being ground successfully in Hardinge mills in all parts of the world, the following are included: gold ores, silver ores, copper ores, lead ores, zinc ores, tin ores, tungsten ores, chrome ores, graphite ores, manganese ores, iron ores, molybdenum ores, platinum ores, limestone, cement clinker, bituminous coal, silica, coke, graphite, anthracite coal, slag, glass, mica, pigments, talc, clays, feldspar, phosphate rock, barytes, fullers earth, sulphur, chemicals, colors, foundry waste, lead skimmings, zinc skimmings, aluminum dross, copper skimmings and iron borings.

There are two distinct types of Hardinge mills—the ball mill and the pebble mill. The ball mill is designed to use steel or iron balls as grinding media, and the pebble mill to use flint pebbles or other similar grinding bodies. These types are used for either wet or dry grinding. The general shape of the two is the same and they are built in nearly the same sizes. The construction of the two types differs, to some extent, on account of the difference in the character of the work which each type is intended to perform.

RICH SILVER ORE AT ALICE ARM MINE.

Now comes another Alice Arm property with ore richer even than the famous Dolly Varden. In opening up their Torie property, which is near to the Dolly Varden, John and Gus Strombeck the owners came across some native silver ore, near to the surface. The Alice Arm Herald says the Torie native silver ore runs 9,600 oz. to the ton. On the No. 2 ledge of the Torie, where this natural silver ore was found, a short tunnel has been driven, and a crossent from this struck a vein three feet wide. The 22 inches of this next the foot wall is high grade, running as high as 209 oz. silver to the ton. The Torie group consists of four claims located in 1914, situated next the North Star, in which McAleenan and Zarelli are interested and which adjoins the Dolly Varden.—Resources Monthly.

PERSONALS.

Mr. L. W. Gibson, Deputy Minister of Mines of Ontario is at Edmonton for the Western Branch meeting of the Mining Institute.

Mr. Robt. Bryce is on a trip to Eastern Canada and New York.

Annual Report of McIntyre Porcupine Mines

The report of McIntyre Porcupine Mines Ltd. for the year ending June 30th 1921, shows net profits were $1,088,514. Shortage of power during three months materially decreased profits. Production was $1,904,326 from 171,916 tons ore which had a gross value of $2,005,672 or $11.67 per ton. Recovery was $11.08 per ton of ore treated.

Operating profit during the year was $815,562. To this is added $269,570 interest and exchange and $3,381 miscellaneous earnings.

There has now been produced by McIntyre a total of $11,035,564 from 1,152,150 tons ore treated.

Development work and exploration during the year included 6,334 ft. drifting, 1,457 ft. cross cutting, and 8,464 ft. diamond drilling.

Ore reserves are estimated at 624,422 tons averaging $10.25 per ton, a total of $6,392,394.

There was treated in the mill 171,716 tons ore. The average recovery was 94.9 per cent. Tailings average 59 cents per ton milled. The mill capacity is to be increased from 500 tons to 1,000 tons per day.

Analyses of mining and milling costs are given by manager Ennis in his report.

THE PRESIDENT'S REPORT.

President J. P. Bickell says in part:

"The total net earnings of only $1,088,513.91 compared with $1,280,232.37 for the previous year is due entirely to the curtailment of our operations from December 26th, 1920, to April 7th, 1921, necessitated by the inability of the power company to take care of the company's requirements. A comparison of the results obtained during this period and the time when sufficient power was available, clearly indicates the seriousness of power interruptions. To safeguard the company's operations the right has been acquired to develop Sturgeon Falls on the Mattagami River, thirty miles distant, and unless we are satisfactorily assured of an adequate permanent supply of power it will be necessary to proceed with this development.

"Notwithstanding the scarcity of labor during the first half of our year, followed by the shortage of power, the development work accomplished has been sufficient to add materially to the ore reserves. The favorable general improvement in our underground development, the downward trend of the prices of commodities and of labor, should enable us to increase the scope of our underground development which will make available a greater tonnage than is required by our present milling capacity. We therefore feel warranted in increasing our milling facilities by the addition of a new 500 ton unit, part of which will be used in treating carbonaceous ores, bringing our production up to 1,000 tons of ore per day."

Profit and Loss Statement
YEAR ENDED JUNE 30th, 1921.

EARNINGS:		
Bullion Recovery		$1,904,326
OPERATING COSTS:		
Mining, Development and Exploration	$615,310.	
Transportation of Ore	39,841.	
Milling	207,190.	
Heating and Maintenance of Buildings and Camps	28,929.	
Employees' Insurance and Welfare	44,169.	
	935,440.	
ADMINISTRATIVE AND GENERAL EXPENSES:		
Management and General Expense—Mine Office	61,732.	
Administrative and General Expense—Head Office	76,712.	
Insurance—General	14,878.	
	153,323	
TOTAL OPERATING COSTS—before providing for taxes and depreciation		1,088,763
NET OPERATING EARNINGS—before providing for taxes and depreciation		815,562
NON-OPERATING REVENUES:		
Interest and Exchange Earned	269,570.	
Miscellaneous Earnings	3,380.	
		272,951
		1,088,513.
APPROPRIATIONS:		
Provision for Municipal, Provincial and Dominion Taxes for current year	64,525.	
Reserve for Plant Depreciation	207,326.	
Holdings in adjoining mining properties written down	1,131.	
TOTAL APPROPRIATIONS		272,983
NET PROFIT FOR THE YEAR, TRANSFERRED TO SURPLUS		$815,530

GENERAL MANAGER'S REPORT.

Manager R. J. Ennis, says in part:—

During the year 171,916 tons of ore were treated having a gross value of $2,005,672 and an average value of $11.67 per ton. Bullion containing 91,330.26 ounces of gold and 19,806.40 ounces of silver valued at $1,904,326 were recovered or $11.08 per ton of ore treated.

An operating profit of $815,562 and a non-operating profit of $272,951 or a total of $1,088,513.91 was earned during the year. An amount of $272,983.79 has been appropriated for depreciation of Buildings, Plant and Equipment and Municipal, Provincial and Dominion Taxes accruing during the period, leaving a net profit of $815,530 transferred to surplus.

Mining.

The total tonnage of ore hoisted through the Main Shaft was 174,030 tons, 153,267 tons were mined in Stopes and from Development, the balance being drawn from Broken Ore Reserves.

The shortage of labor during the first half of the period and the shortage of hydro-electric power from December 26th, 1920 to April 7th, 1921 compelled us to curtail work in the stopes. The labor and power available was used in mine development and milling operations. The result has been the reduction of the Broken Ore Reserves in Stopes from 113,511 tons at June 30th, 1920 to 929,748 tons at the end of the fiscal period. With the improvement in the labor situation and full power being available the breakage of ore in stopes is now 50 per cent in excess of mill requirements.

Ore Broken in Stopes	134,530 Tons
Ore from Development	18,737 Tons
Ore Hoisted	174,030 Tons
Waste Hoisted	21,899 Tons

Summary Of Ore Hoisted

LEVEL	TONS	ASSAY	VALUE
600	2,138	7.00	$ 14,966
700	1,623	9.25	15,012
800	4,433	14.75	65,386
1,000	47,731	13.85	661,074
1,125	53,022	9.85	522,266
1,250	31,356	14.15	443,687
1,375	30,565	9.15	279,669
1,500	3,162	9.00	28,458
	174,030	11.58	$2,030,520

Development.

Development work done during the year was confined to the 1,125, 1,250, 1,375 and 1,500 foot levels. The carbonaceous schist encountered in the lower levels of the mine occurs in a series of south dipping thrust faults intersecting No. 5 Vein for a distance of 350 feet on the 1,250, 420 feet on the 1,375 and 435 feet on the 1,500. Drifting in this faulted zone opened up sections of No. 5 veins of good stoping width, but in mining this ore will be diluted with carbonaceous material requiring special treatment before cyanidation.

Considerable development has been carried on to the west and below the carbonaceous zone on the four lower levels and on each level No. 5 Vein has been found to continue below the zone without appreciable change of values, three stopes now producing ore from this section of a value of from $13.00 to $16.40.

On the 1,125 a crosscut south in the Jupiter claim

Production Since the Commencement of Milling Operations in 1912.

DATE	PERIOD	TONS MILLED	VALUE PER TON	GROSS VALUE	RECOVERY	
					PER TON	TOTAL
1912	12 Months	14,5000	$7.00	$ 101,555	$5 25	$ 76,166
1913	12 Months	31,979	7.85	251,314	7 05	225 752
Jan. 1 / 14 to Mar. 31 / 15	15 Months	85,654	8.87	760,232	8.39	718,331
April 1 / 15 to Mar. 31 / 16	12 Months	105,758	7 71	815,345	7.38	779,990
April 1 / 16 to June 30 / 17	15 Months	195,307	10 00	1,954,793	9.55	1,864,914
July 1 / 17 to June 30 / 18	12 Months	178,327	10.05	1,793,197	9 61	1,714,258
July 1 / 18 to June 30 / 19	12 Months	179,874	9 78	1,759,627	9 29	1,671,646
July 1 / 19 to June 30 / 20	12 Months	188,835	11 52	2,175,891	11 02	2,080,178
July 1 / 20 to June 30 / 21	12 Months	171,916	11 67	2,005,672	11.08	1,904,326
		1,152,150	$10.08	11,617,628	$9.58	11,035,564

PRODUCTION BY PERIODS

DATE	TONS MILLED	VALUE PER TON	GROSS VALUE	PRODUCTION	OPERATING EXPENSES		OPERATING PROFIT	
					PER TON	TOTAL	PER TON	TOTAL
1920								
July 1 to July 28	14,960	11.87	$177,509	$168,173	5 35	$80,060	5.91	$88,412
July 29 to Aug. 25	15,060	11.85	178,397	169,060	5 25	79,067	5.97	89,992
Aug. 26 to Sept. 22	14,710	11 77	173,170	164,512	5 59	82,231	5.59	82,280
Sept. 23 to Oct 20	14,830	11.10	164,664	155,890	5 42	80,393	5 09	75,496
Oct. 21 to Nov. 17	14,795	10.91	161,274	152,667	5 43	80,433	4.88	72,233
Nov. 18 to Dec. 15	14,790	10.94	161.818	154,183	5.55	82,128	4.87	72,054
1921								
Dec. 16 to Jan. 13	10,420	12.63	131,592	124,820	7 49	78,131	4.18	46,688
Jan. 14 to Feb. 10	8,984	13.34	119,830	113,740	8 60	77,271	4 05	36,468
Feb. 11 to Mar. 10	8,547	10.21	87,268	82,384	9.39	80,260	.24	2,123
Mar. 11 to April 7	9,330	12 00	112,010	106,457	8.31	77,534	3 09	28,922
April 8 to May 5	15,060	11.74	176,746	167,641	6.19	93,356	4.93	74,284
May 6 to June 2	15,200	11 85	180 047	171,854	6.51	98,954	4.79	72,899
June 3 to June 30	15,230	11.91	181,347	172,645	6 49	98,939	1 83	73,705
	171,916	11 67	$2,005,672	$1,904,326	6 33	$1 088,763	4 74	$815,562

Analysis of Mining Costs—Per Ton Milled

	BREAKING AND STOPING	DRIFTING	CROSS-CUTTING	RAISING	SINKING STATIONS AND SUMPS	TOTAL COST	COST PER TON
	$	$	$	$	$	$	$
Labor	165,134	57,299	11,323	2,879	4,163	240,800	1 4007
Explosives	30,228	30,085	7,742	1,698	1,009	70,764	1116
SUPPLIES	8,980	15,651	404	116	412	25,565	1487
POWER	26,994	16,819	3,321	710	405	18,252	2807
WORKSHOPS	6,274	652	104	52	280	7,365	0128
HOISTING	63,533	10,852	2,877	2,877	817	78,377	1559
TIMBERING	36,279			351	1,739	11,369	2106
ROCK DRILL MAINTENANCE	9,398	5,328	1,279	335	277	16,619	0967
SHARPENING STEEL	8,832	5,046	1,202	315	260	15,656	0191
PUMPING AND VENTILATING	14,009	2,396	634	65	180	17,286	1006
ASSAYING AND SAMPLING	9,194	4,452	377	401	51	14,477	0842
SUPERINTENDENCE	7,493	1,309	339	34	96	9,273	0539
SURVEYING AND ENGINEERING	9,122	1,592	413	42	117	11,288	0657
	395,475	151,488	30,021	7,300	12,812	597,098	3 1732
EXPLORATION						16,827	0979
						613,926	3 5711
EXAMINATION OF PROSPECTS						1,384	0080
						615,310	3 5791

intersected No. 7 Vein and developed 290 feet of ore of an average grade of $11.60 over 10 feet in width.

On the 1,250 foot level 1,227 drift was continued on No. 5 Vein 630 feet to the west property line, 200 feet being carbonaceous ore averaging $6.00 over 7 feet and 430 feet in ore averaging $14.35 over 9 feet. 1,226 drift was continued east 145 feet on $7.00 ore. A crosscut south on this level cut No. 7 Vein, which has been drifted on for a distance of 250 feet showing more or less erratic assays. No. 7 Vein at this horizon runs into the overlying porphyry and values are not expected to continue into this formation.

On the 1,375 foot level 1,327 drift was advanced 735 feet to the west property line. 115 feet in the carbonaceous zone developed 74 feet of ore averaging $9.80 over 7 feet and 650 feet underlying the carbonaceous zone developed 527 feet of ore averaging $16.85 over 10 feet in width. 1,326 drift was continued east 420 feet extending 200 feet into the west Jupiter lot and developed 217 feet of ore averaging $8.10 over 10.4 feet. A crosscut was run south to No. 7 Vein and a total of 840 feet of drifting was accomplished on this vein system. 740 feet of ore was opened up of an average value of $9.00 over 10.1 feet. A crosscut to the south 360 feet from the west property line has opened up an important westerly extension of No. 7 Vein. This ore lies in the contact between the porphyry and the greenstone schist and development shows it to be 28 feet wide and averaging $14.50.

On the 1,500 foot level 1,527 drift was advanced 330 feet developing 113 feet of carbonaceous ore averaging $6.35 over 5.7 feet. The drift was advanced to the west and opened up 200 feet of ore of an average grade of $11.10 over 9.6 feet. 1,526 drift was advanced to the east 525 feet developing 179 feet of carbonaceous ore averaging $6.30 over 8.3 feet and 265 feet of ore averaging $8.50 over 7.3 feet. This drift extends 140 feet into the west Jupiter lot and continues in good ore. A crosscut on this level was run south 450 feet to the contact and No. 7 Vein system. Two veins were intersected, the north branch was developed for a distance of 360 feet in medium grade ore, the south or contact branch was developed for a distance of 370 feet in ore averaging $9.75 over a width of 8 feet.

The Main Shaft is being sunk from the 1,500 foot level, and new levels will be opened up at 1,625, 1,750 and 1,875 feet. A main haulage level will be established on the 1,875 with ore and waste pockets. Ore passes will be run to the intermediate levels so that all hoisting may be concentrated on the main haulage level. The Main Shaft has reached the 1,610 horizon.

Exploration.

Below the 1,250 foot level the contact between the greenstone-basalt schists and the porphyry, which strikes southwest, flattens out and the area of favorable ore-bearing formation is increased. Diamond drilling from the lower levels to delimit this area is progressing rapidly.

No. 5 Shaft is being raised from the 1,375 to the 1,000 and when completed will be sunk to the 1,500 foot level to facilitate the development of the lower levels.

MILLING RECORD—TONS MILLED, 171,916

DATE	TONS MILLED	VALUE PER TON	GROSS VALUE	PRODUCTION	PER TON MILLED	TAILINGS	PER TON MILLED	EXTRACTION %	RUNNING HOURS	TIME %
1920-1921										
July 1st to July 28th	14,960	$11.87	$177,509	$168,473	$11.26	$9,036	$.60	94.9	659	98.0
July 29th to Aug. 25th	15,060	11.85	178,397	169,060	11.23	9,337	.62	94.8	662	97.5
Aug. 26th to Sept. 22	14,710	11.77	173,170	164,512	11.18	8,658	.59	95.0	644	95.8
Sept. 23rd to Oct. 20th	14,830	11.10	164,664	155,890	10.51	8,774	.59	95.0	663	98.7
Oct 21st to Nov. 17th	14,795	10.91	161,274	152,667	10.32	8,607	.58	95.0	654	97.3
Nov. 18th to Dec. 15th	14,790	10.94	161,818	154,183	10.42	7,635	.52	95.0	654	97.3
Dec. 16th to Jan. 13th	10,420	12.63	131,592	124,820	11.98	6,772	.65	94.9	494	73.5
Jan. 14th to Feb. 10th	8,984	13.34	119,830	113,740	12.67	6,090	.67	94.9	429	63.8
Feb. 11th. to Mar. 10th	8,547	10.21	87,268	82,384	9.64	4,884	.57	94.4	348	51.8
Mar. 11th to April 7th	9,330	12.00	112,010	106,457	11.41	5,553	.59	95.0	384	57.1
April 8th to May 5th	15,060	11.74	176,746	167,641	11.13	9,105	.60	95.0	640	95.2
May 6th to June 2nd	15,200	11.85	180,047	171,854	11.31	8,193	.54	95.0	656	97.6
June 3rd to June 30th	15,230	11.91	181,347	172,645	11.32	8,701	.58	95.0	666	99.1
	171,916	11.67	2,005,672	1,904,326	11.08	101,345	.59	94.9	7,553	85.5

MILLING COSTS

	LABOUR	SUPPLIES	POWER	WORK SHOPS	TOTAL	COST PER TON
Ball Mills	$ 6,284	$22,283	$ 7,552	$3,388	$39,508	$ .2298
Classifiers and Tube Mills	6,284	14,882	16,893	4,232	42,292	.2460
Reagents	.....	31,028	.....	.....	31,028	.1805
Agitators	5,822	1,639	10,884	970	19,316	.1124
Thickeners	5,755	1,012	1,147	267	8,183	.0476
Clarification	5,204	2,256	729	560	8,750	.0509
Precipitation	8,333	7,782	797	72	16,985	.0988
Pumping and Elevating	3,400	4,862	686	1,305	10,255	.0597
Heating	3,933	7,278	.....	.....	11,212	.0652
Refining	5,081	6,624	3,777	1,458	16,941	.0985
Assaying	1,634	922	75	83	2,715	.0158
	$51,733	$100,574	$42,544	$12,338	$207,190	$1.2052
Unit Cost	.3009	.5850	.2475	.0718		

Operating Costs

Mining:	Total	Cost Per Ton
Exploration	$16,827	.0979
Developments	201,622	1.1728
Breaking and Stoping	395,475	2.3004
	$613,926	3.5711
Examination of Prospects	$ 1,384	.0080
Crushing and Transportation of Ore	39,841	.2317
Milling	207,190	1.2052
Heating and Maintenance—Buildings and Camps	28,929	.1683
Employees' Insurance and Welfare	44,169	.2569
Management and General Expense—Mine Office	61,732	.3592
Administrative and General Expense—Head Office	76,712	.4461
Insurance—General	14,878	.0866
	$1,088,763	6.3331

Estimated Ore Reserves

	Tons	Assay	Amount
McIntyre Claims	224,586	10.55	$2,366,524
McIntyre Extension Claims	205,007	10.50	2,153,981
Jupiter Claim	102,081	7.95	813,275
Broken Ore Reserves in Stopes	92,748	11.40	1,058,614
	624,422	10.25	$6,392,394

In the above estimate of ore reserves, ample allowance has been made for the reduction of values due to barren schist inclusions in the vein and dilution of broken ore by wall rock.

Milling.

The increased quantity of carbonaceous ore in the mine made the problem of finding a successful method of milling this class of ore of considerable importance. Experimental work and a study of the question has resulted in the development of a process that will satisfactorily treat ores containing carbonaceous matter without the aid of flotation. After a preliminary treatment in the ball and tube mill circuit the ore can be safely sent to the cyanide plant without danger of causing a premature precipitation of gold.

The milling capacity of the plant will be increased by the addition of a new 500 ton unit equipped to handle carbonaceous ores.

Additions to Buildings, Plant and Equipment

New Refinery	$25,285
Dwellings and Equipment	10,204
Power House Equipment	7,053
Pumps and Pump House for Tailings Disposal	6,529
General Store and Dining Room	94,930
Head Office Furniture and Fixtures	2,179
Mine Office Furniture and Fixtures	125
Stable Equipment	1,290
Recreation Hall	27,113
Cyanide Mill Equipment	5,515
Assay Office and Workshops	1,207
Bunk House Additions and Equipment	5,009
Electrical Equipment, Lines and Transformers	13,781
Moveable Equipment	1,106
Underground Equipment	12,185
	$216,517

Underground mine development during the year has continued to give satisfactory results, and if we are assured of a continuous and adequate power supply the development work for this year promises to be equally satisfactory.

SOME INTERESTING COAL MINE EQUIPMENT IN WEST VIRGINIA AND KENTUCKY.

By C. H. McL. BURNS.

Every mining field has its individual problems, but even these vary greatly in the same field and from time to time. To be in the best position to cope with the ever changing and entirely new conditions met with from day to day, the mining man should find it of considerable value to keep more or less in touch with the problems existing in other fields, and the methods adopted for their solution, even if they appear for the time being very dissimilar to his own.

In Nova Scotia, probably the most striking feature of coal mining is the underground development and equipment of its submarine mines and the very diffieult problems met with in their operation. Throughout the anthracite regions of Pennsylvania the visitor finds the mine itself overshadowed by the elaborate surface plants for the preparation of the coal for a diversified and exacting market. In the bituminous fields of the Virginias and Kentucky, the newness of the field—and it is the newest coalfield to be developed in the east—the remarkable development of its mines in the last few years and the very modern and in many cases rather novel surface arrangements are the most interesting.

The coal is bituminous and, taken as a whole, of a superior quality. The seams range from two feet and under to twelve and fourteen feet thick, although the largest percentage of the coal mined comes from seams from four to six feet thick. The mountains are very much broken up by gulches, down which flow the numerous creeks and rivers which divide the ranges into their many ridges, and make the country accessible to railways. As soon as a railway extension is constructed up a creek and new timber and coal lands, tapped, mines are opened and tipples constructed, in many cases ready to ship coal before the railway. The seams as a rule lie at very flat inclinations and the mine openings are by drifts into the side of a ridge at varying elevations above the creek bottom. In many places a number of superemmbent seams are worked from the one hillside. The mines are, practically all, electrically equipped throughout with coal cutters, rock and coal drills, mine fans and mine locomotives. Approximately sixty five per cent of all coal mined in West Verginia and eighty five per cent of that mined in Kentucky is machine coal. All the rest is from hand picks, practically no coal is shot from the solid.

As anthracite monopolized the domestic market, little attention was paid for a number of years to the preparation of the coal. It was practically all used for steaming and cooking purposes and was shipped from the mine over crude tipples, as run of mine. In recent years the rapid development of the field, together with very efficient equipment and modern methods of production underground, has resulted in very high production and consequently keener competition for the markets. Many of the operating companies have been quick to realize the necessity for a superior product to meet this competition and the definite specifications of a discriminating trade and have rounded off their well equipped underground plants with equally modern and efficient surface plants for the preparation and shipment of their coal, and have incidentally discovered that these plants, besides increasing the value of and market for their coal, handle it

more economically than the out of date methods previously employed.

The older method of switch-back, or inclined tramway, which delivered the coal in trips of mine cars to a dump house at the railway siding, with its intermittent delivery, its high speed of operation and consequent breakage and risk of accident, its excessive wear and tear on equipment, necessitating high maintenance charges, has been relegated to the past, and instead of the older and inefficient methods, retarding conveyors are used which handle the coal from the mine to the tipple at the railway in a continuous stream with a minimum of breakage, and eliminate entirely that bugbear to efficient operation, alternate rush and idle periods. Some of these conveyors are operating on grades as steep as 35 to 40 degrees and over a quarter of a mile long. In many cases the same conveyor has a loading point at two or more mine openings on the hillside and delivers the coal from all mines to the same screens and loading plant. In cases where the coal from different seams varies considerably in its coking properties, two conveyors are used delivering the coal to separate screens and loading tracks. In these installations the coal is brought from the mine, usually with electric locomotives, and run over a mine car dump at or near the mine opening. The coal is fed from here by means of an apron or reciprocating feeder, continuously and at a moderate rate to the conveyor, which carries it to the screen house at the railway siding, where it is screened and picked, then delivered to the railway cars on loading booms, so in the whole journey from the mine face to the railway car, the coal is subjected to the very least possible dumping and breakage. This is especially advantageous in marketing a soft bituminous coal.

One method often adopted might be mentioned here. In many of these installations the coal is picked before it is screened or sized. This eliminates more picking tables and men than are absolutely necessary to handle the tonnage. The coal is discharged over a gravity bar or lip screen from the retarding conveyor to the picking table or tables, and a large percentage of the slack removed and placed on the table back of the lump coal to prevent breakage and facilitate picking.

Another point is the extensive use of lip screen plate as compared with the ordinary perforated plate on both gravity and shaker screens. It gives much better results with bituminous coal than either perforated plate or wire mesh.

The mine car dumps are worthy of notice. Practically all of the standard cross over and rotary dumps are represented. The tendency is of course to speed up this operation to the limit and return the cars to the face. Three compartment rotary dumps operated by gravity are used which almost approach continuous operation, but they are rather large and unwieldy and seem to be in the same class with another type in successful operation, which is of the single compartment type, but long enough to dump a whole trip of twenty-five cars at a time. This, however, is going to the extreme and it is very doubtful whether or not the time saved warrants the rather expensive equipment involved. The dump most in favor and probably the fastest of all is the power operated, single compartment rotary dump of the standard type with some accessories, which dumps one, or at the most two or three, cars in tandem, without the necessity of uncoupling the trip. Swivel couplings are used on the cars and the centre of the dump is made co-incident with the couplings of the car. Its successful operation depends on securing the proper grade of the track entering and leaving the dump, and the proper control of the trip by means of a series of automatic car stops, which take the impact of the oncoming loaded trip and the pull of the empty cars, allowing the dumping car perfect freedom in action, and at the same time imparting sufficient momentum to the empty car to move it away quickly. These dumps have actually attained a speed of seven cars a minute in continuous operation. The cars are also handled in train over the scales, by a similar arrangement of grades and stops.

A very good example of many of these new tipples is that of the Powhatan Coal and Coke Co., at Powhatan, W.Va. This company has been operating since 1889 on the No. 3 Pocahontas Seam in the heart of the famous Pocahontas coal region. The coal seam outcrops at an elevation of about 325 feet above the lines of the Norfolk and Western Railway. The mining is by the double entry panel system with two main drift openings and the mine is electrically equipped. The accompanying perspective drawing gives a very clear idea of the equipment for this tipple, which has a capacity of 450 tons per hour. As can be seen from the drawing, the tipple is divided into two parts; the low building over the tracks is for the screens and picking tables, while the high one to one side contains the pea, the slack and the refuse bins.

A very unique and interesting surface layout, designed to overcome a rather serious and difficult problem is that of The Eureka Coal & Mining Company of Prestonburg, Kentucky, which in developing the property, found the mines separated from the railway by a stream of considerable size, with a soft muddy bottom. The mine openings were in the side of a hill along the Big Sandy River, on the Big Sandy division of the Chesapeake & Ohio Railway. The river, at this point, is about two hundred feet wide with banks on one side about forty eight feet above low water. The ground here back to the mine openings is practically level, a distance of about two hundred yards. The opposite bank is the side of a very high hill along which the railway runs through a rock cut at approximately the same elevation as the side on which the mines are located. The river is navigable at this point and, under the ruling of the U. S. War Department, either a draw bridge or one with an eighty foot clearance above low water had to be adopted. The expense of a railway draw bridge at this point made it out of the question, as was a railway bridge eighty feet above low water, or approximately thirty feet above the railway grade. An aerial rope tramway was at first considered, but was dismissed on account of its low capacity. On the railway side the rock cut was very narrow and left very little room between the main line and the river bank for a tipple. The problem was eventually solved by the engineers of the Link-Belt Company, by dividing the plant between the two sides of the river and carrying the coal across on a belt conveyor, which in turn was carried on a light suspension bridge. The coal is brought from three mines by electric locomotives, of the trolley type, to a dump house near the river bank. The coal is fed from the dump hopper to a flight conveyor by a reciprocating feeder and carried up a 45 degree incline by this conveyor to to a head house, where it is discharged to the belt conveyor over a lip-screen chute,

which places a considerable amount of slack on the belt, just behind the lump discharge, and minimizes the breakage, due to this transfer, to a minimum. On the railway side of the river, the coal is discharged to shaker screens of the lip-screen type and thence over picking tables and loading booms to the railway cars. The whole construction is timber, the oak being cut and sawed on the ground. The towers are sixty eight feet high from their foundations and one hundred and fifteen feet above low water. The bridge is two hundred and fifty feet, centre to centre of towers. These are built of six by twelve inch timbers and supported on reinforced concrete and masonry foundations. The suspension cables are each two inch galvanized bridge cables under a stress of 110,000 lbs. each, from which the bridge floor is suspended by Ernst patent hangers, spaced five feet, six inches, apart. The wire rope work was designed and erected by the A. Leschen & Sons Rope Company. The plant has a capacity of two hundred and fifty tons per hour.

Although many of the coal companies employ engineers of their own they seem to find it more economical in the long run to entrust the design and construction of their plants to engineering concerns with a large number of specialists on their staffs and a long record and broad experience back of them. In such cases the firm taking the contract guarantees the successful operation of the plant. Practically all of the large plants in this field have been designed and built by engineering companies specializing in that line of business. There is no doubt but that the experience and suggestions of the operating company and its engineers, coupled with that of the firm of specialists, results in a more efficient design than could be worked out by either individually. In recent years these companies are getting more and more of the tipple business and many contracts are placed with them without resorting to competitive bidding, because the operators realize that low first cost does not necessarily mean a saving to their company and that money wisely spent at the outset does mean low maintenance costs and therefore insurance on the investment, while competitive bidding nearly always results in a design and construction cheaper in first cost than is warranted by good practice, simply because the best is apt to be too expensive for success against less reliable competitors. It is doubtful whether an operating company could design and erect the same plant at as low a cost as the firm of specialists.

REMEMBER THE CONVENTION AT CHICAGO.

As the date for the twenty-fourth annual convention of the American Mining Congress and National Exposition of Mines and Mining Equipment draws nearer, it becomes increasingly clear that it will be an affair of outstanding importance and magnitude—one thoroughly representative of the countries, districts and associations interested in all phases of the mining industry. The convention will be held at the Coliseum, Chicago, on the 17th to 22nd October next, inclusive. The Canadian Mining Journal will be represented by a booth, of which Mr. H. W. Thompson, our Western Manager, will be in charge, and where all who may desire information, with respect to any branch of the industry are asked to bring their enquiries.

INDUSTRIAL ACCIDENTS.

How a billion dollars a year can be saved to the industries of the United States by the prevention of the 20,000 deaths caused annually by industrial accidents, and the thousands upon thousands of injuries sustained by workers in industry, will be demonstrated at the Tenth Annual Congress of the National Safety Council which is to be held in the Massachusetts State House, Boston, September 26th to 30th. A billion dollars a year is the cost of industrial accidents, the National Safety Council has shown, and it has been proved that these accidents can be prevented, and this sum saved through effective safety work. The problem of maintaining effective safety work during the present business depression and accomplishing this enormous saving, more important to industry than ever before during these times when every possible economy and retrenchment is being made, is one of the main topics set for discussion at the safety congress. The solution of this problem, it is expected, will be found at this conclave of the foremost safety leaders in the United States.

Prominent among the hundreds of speakers on industrial safety subjects are H. S. Firestone, President of the Firestone Tire and Rubber Company, Akron, Ohio; C. W. Galloway, Vice-President in charge of operation and maintenance, Baltimore and Ohio Railroad; Ida M. Tarbell, well-known industrial writer, New York; Dr. R. R. Sayers, Chief Surgeon, United States Bureau of Mines; Brigadier-General Charles E. Sawyer, Medical Reserve Corps, U. S. A. (President Harding's personal physician); W. E. Worth, Assistant Manager of Industrial Relations, International Harvester Company, Chicago; F. W. Wilcox, Chairman, Industrial Commission of Wisconsin; Charles B. Scott, General Manager, Bureau of Safety, Chicago; David S. Beyer, Vice-President and Chief Engineer, Liberty Mutual Insurance Company, Boston; E. L. Bair, Vice-President, Benefit Association of Railway Employees, Chicago; Dr. Lucian W. Chaney, United States Bureau of Labor Statistics; Frank B. Gilbreth and Lillian M. Gilbreth, consulting engineers, Montclair, N. J.; and H. W. Forster, Vice-President, Independence Bureau, Philadelphia.

CANADA LEADS IN SOME MINERALS.

Substantial evidence of Canada's importance as a mineral-producing country is found in a statistical summary issued by the Imperial Mineral Resources Bureau of the British Government, entitled, "The Mineral Industry of the British Empire and Foreign Countries," covering production, imports and exports for the years 1913 to 1920. From the last available figures, Canada occupies foremost place in the yearly production of asbestos, mica and nickel ore. In 1920 Canada produced 149,760 long tons of asbestos, with Southern Rhodesia coming second at 16,806; in 1919 the production of mica amounted to 2,459 long tons, India being next at 2,289; in 1920 nickel ore mined in Canada totalled 27,293 long tons, with New Caledonia second at 7,400. Canada stands second in the list of countries producing the following minerals for the year 1920: arsenic, 2,150 long tons; felspar, 32,907; gypsum, 411,030; pyrites, 156,021.

MOOSE MOUNTAIN.

Some experimental work is being carried on at the Moose Mountain iron mine at Sellwood, Ontario.

Mineral Production in Canada

[The following account is extracted from the Preliminary Report on the Mineral Production of Canada issued by the Dominion Bureau of Statistics].

The value of the economic mineral production of Canada during the first six months of the present year reached a total of $24,264,423 as compared with $75,737,472 for the metals produced during the twelve months of the calendar year preceding. The value of the production for the half-year period was thus slightly more than thirty-two per cent of the annual production just recorded. In point of value, therefore, if present conditions continue until the end of the year, the production of metallic minerals in 1921 will not be much in excess of the similar production of 1911, which reached a total of $46,105,423.

Among the metals, lead was easily the leader during the half-year. The quantity produced was more than ninety-one p. c. of the total during the entire calender year 1920, and even at the lower price which prevailed for this metal during the half-year the value of the production exceeded fifty-eight per cent of that assigned to the calendar year output for 1920. The demand for the metal has been fairly good, a considerable quantity finding its way into the manufacture of type metals, babbits and solders, and for the manufacture of corroded white lead as well as in the production of lead shot and other forms used as ammunition. The silver-lead ores of British Columbia furnish by far the greater part of the lead during the period, but appreciable amounts were also recovered from lead ores mined in Ontario and Quebec. Canada foreign trade in lead shows an appreciable decline in imports during the six months period, the total for this year being only about one-tenth of the value of lead and its products imported during the calendar year 1920. Exports on the other hand during the six months were more than double the amount of the twelve months of the preceding year. It will be seen that the lead mining industry in Canada has been able to maintain its position even in the face of declining prices and commercial depression.

The production of zinc is closely allied to the production of lead, most of these two metals being produced from the silver-lead-zinc ores of British Columbia. During the six months, the production of zinc amounted to more than seventy per cent of the quantity produced during the calendar year 1920, and to almost forty-five per cent of the value of that year's production. As in the case of lead, prices showed a great decline, the average for zinc was nearly three cents lower than the twelve months in 1920. The production therefore of more than twenty-eight millions pounds of zinc was very profitable. Foreign trade was maintained at about the same rate as during the first six months of 1921.

The leading metal industry in point of view of value produced during the six months was gold. This industry has enjoyed a considerable impetus during the past year, and the rate of production established in 1920 was easily maintained. One of the reasons for the activity in gold mining is the fact that all sales of Canadian gold are paid for in New York funds and the exchange situation between this country and the United States has enabled the gold producers to obtain approximately three dollars an ounce more for their gold than with exchange at par. At the time of writing the gold camps of Ontario are operating to capacity. More than eight million dollars worth of gold was produced in Canada during the first half-year and the output was almost fifty-two per cent of the quantity and value of the entire 1920 production.

Silver ranked fourth among the metals produced in Canada during the first six months of the present year considered in relation to the output for the twelve months of the calendar year preceding. The total production amounted to more than 49 per cent of the quantity and to more than 29 per cent of the value. Prices which slumped rapidly have been fairly stable during recent months, and while the average for the six months has been only 59.8 cents per ounce, as compared with 100.9 cents per ounce during the calendar year 1920, the steadiness of recent markets has enabled the operators to plan more definitely for the future. A number of closed mills will in all probability renew operations shortly if present conditions continue. Ontario was the principal producer, the output being obtained by the South Ontario smelters and the large reduction plants in the Cobalt area from ores mined in the Cobalt district. Exports of silver bullion during the last six months increased by more than one million ounces, and imports of silver in the several forms declined to about one-eighth of the value of silver products brought into Canada during the calendar year 1920.

Copper produced during the first half of the year amounted to only 31.5 per cent of the quantity recorded for the calendar year 1920, and to only 22.5 per cent of the value of the metal for the same year. The price of copper showed a gross decline of more than 5½ cents per pound from that prevailing during the first nine months, of 1920 and this slump has carried the price down until at the end of the half-year now reviewed, the price quoted for copper is more than 2½ cents per pound lower than the average price prevailing during the ten-year period preceding the war. The hesitant and subnormal market prevailing throughout 1920 has settled somewhat this low level to a point which it is expected will remain stable. While the output of copper during the half-year amounted to nearly 26,000,000 pounds, the quantity of copper held in stock has increased to such an extent that the prospects for the industry in the immediate future are not bright. The principal producing provinces were British Columbia and Ontario, the former producing slightly more than twice as much as the latter during the period.

Nickel and Cobalt follow in the order named, the former producing an amount equivalent to 21 per cent of the 1920 output and the latter about 20 per cent. The markets for nickel and cobalt have been dormant during the period and prices nominal.

Of the Non-Metallics, coal was, as usual, the most important. The output for the period amounted to only 86 per cent of the quantity produced during the same six months of 1920, but the value per ton determined as the average for the whole of Canada and without regard to kinds of coal produced, was $5.75, which is somewhat higher than the average recorded for the calendar year preceding.

Copper.

The decline in the price of copper which set in about September, 1920, continued to the end of the year at which time the price had reached the low level of

thirteen cents. During the six months ending June 30, there was a further slight reduction so that the average for the six months period of the current year was 12.501 cents a decline of more than two and one-half cents from the ten-year period preceding the war. Considered in relation to the first nine months of 1920 the drop was about five and one-half cents per pounds, with the result that in Canada as in other copper producing countries, production during the past six months suffered a decline. The fluctuations of the market have caused some anomalous conditions. For instance, the quantity of copper produced in 1920 was greater than was produced in 1919, but the average yearly price of the metal was so much lower that the value of the product of the metal was less than in 1919. Large stocks accumulated during the last three months last year and many copper producers found it necessary either to close down entirely or to curtail operations. Until the industrial demand for copper is restored and the stocks of new and secondary copper and copper alloys are actually used up, it is apparent that there is little prospect of activity for the copper industry. Undoubtedly, however, the development of hydro-electric enterprises, the electrification of railways, and the promotion of other large copper-consuming enterprises will cause a reaction.

The Dominion production from all sources for the period was 25,707,301 pounds which at the average price of 12.5 cents has been valued at $3,213,413. During the twelve months of 1920, production was 81,600,-691 pounds, worth $14,244,217. The principal producing provinces were British Columbia and Ontario the former producing 68,63 per cent and the latter 31.19 per cent of the total.

There was also a small production during the period from pyritic ores of Quebec which were mined as usual for use in the manufacture of sulphuric acid and the cinder exported for the recovery of copper.

Gold.

The total gold production of Canada during the first six months of this year amounted to 396,391 fine ounces, worth at the standard value for gold, $8,194,-129. The period's production, therefore, represented 52 per cent of the whole amount produced during the preceding calendar year, and at the time of writing, the gold mining industry throughout the Dominion is in a flourishing condition. A feature of the market for gold is that all sales to the Royal Mint, Ottawa, are paid for in New York funds. Exchange on the Canadian dollar in New York has remained fairly constant around 12 per cent during the period, so that gold producers benefited considerably.

Ontario is the premier gold-producing province of the Dominion, the output from this province alone, during the past six months constituting 73.5 per cent of the entire Canadian production. At the present time, the gold mines of Ontario are being operated to capacity and the industry is prosperous. During the earlier months of the year, however, the productive capacity of these mines was curtailed principally because of the shortage of hydro-electric power. The mild winter and the unusually light snowfall left the rivers and streams with little of the customary reserve water supply in the spring.

British Columbia ranked second as a gold-producing province and accounted for 22.9 per cent of the total produced. Compared with the gold output recorded for the province during the year 1920, the production for the six months showed a remarkable gain in spite of the fact that several of the larger mines operated during 1920, were idle during the half-year period just closed.

The Yukon, which for so many years led the way in gold production, has long conceded first and second place, and for the period now reported ranked third among the producing areas. The whole production in the Yukon was, as usual, from placer deposits, and while most of the gold was obtained by two large operators, considerable quantities were recovered by the three hundred or more individuals, or partnerships, also working in the Territory.

Quebec, Nova Scotia and Manitoba followed in order, for the six months period, but the combined output of gold from the three provinces amounted to only about one thousand fine ounces in all, an almost negligible amount in comparison with the production by the leaders.

Lead.

Notwithstanding the general decline in prices during 1920, and the half of 1921, the quantity of lead recovered by the Canadian smelters and contained in shipments exported has shown a notable increase. The producing provinces namely British Columbia, Ontario and Quebec have made very creditable showings as compared with the year 1920. The price of lead per pound in hundred pound lots on the Montreal market, which was 11 cents in March, 1920, had by December of the same year fallen to 6.75 cents per pound. During the period now reviewed, the average price was 5.73 cents. Lead is probably in the strongest position of any metal; the buying movement while not strong, has been fairly constant, the paint, ammunition and white metal industries absorbing considerable quantities.

The Dominion production from all sources equalled 32,875,616 pounds which at the average Montreal price of 5.73 cents had a value of $1,883,773. The production for the calendar year 1920 was 35,953,717 pounds, average price 8.94 cents with a value of $3,214,262. As compared with entire year 1920, the production for the half-year period was therefore 82.4 per cent of the quantity and 58.6 per cent of the value of the previous year's production. British Columbia produced 30,659,-410 pounds or 93.2 per cent of the Canadian output; Ontario, 1,513,774 pounds, or 4.6 per cent; and Quebec, 702,432 pounds or 2.1 per cent.

Nickel.

Considering the total lack of markets, the production of nickel during the period in Canada has been considerable. As usual the principal output was from the nickel copper area of Sudbury, Ontario, supplemented by a small production derived from the treatment of silver cobalt ores. Due to the overstocked condition of the world's nickel markets and the consequent comparatively small demand for nickel, large stocks piled up during the two years following the armistice, but the Canadian output during the last six months was creditable. Compared with the quantity and value of that for twelve months of 1920, the output for the period was 21.11 per cent of the quantity and 21.44 per cent of the value.

Silver.

Judging from returns for the first six months, the production of silver in Canada for the year 1921 bids fair to equal if not surpass that of the previous year. The uniform price of silver during recent months, while still below last year's average has tended to stabilize the industry and enable operators to survey the situa-

tion and plan their action with some degree of confidence. Declining costs of materials and wages have each contributed towards a greater margin between cost of operation and value of metal produced.

These factors have affected the situation to a greater extent in Ontario than in the other provinces where silver is more or less a by-product in the recovery of other metals. The Cobalt district is credited with the major portion of the production and during the latter part of the half-year period showed signs of renewed activity. During the early months of the year the low price of silver, the high cost of production and the power shortage caused a great depression. A number of companies operating on low grade ores were forced to close down. The Mining Corporation took advantage of the situation and closed its mill in March to make alterations with a view to an increased capacity when more favorable conditions should prevail. The mill was re-opened in May with brighter prospects for profitable production. The close of the half-year saw a number of the smaller companies in operation in addition to the four leading companies — the Nipissing, Mining Corporation, O'Brien and Coniagas. A number of former producers have every prospect of an early renewal of operations should the price of silver hold steady and the expected decline in operating costs take place.

The production of silver in Canada from all sources during the first six months of 1921 totalled 6,545,481 fine ounces, which was 40.10 per cent of the total production for 1920, when 13,330,357 ounces was reported. The average price in 1920 was 100.9 cents per ounce and the total value computed at this rate was $13,450,330. In 1921 for the first half year the average price dropped to 59.81 cents per ounce, and the value on this basis to $3,914,852, which is 29.1 per cent of the value for the year 1920. Computed from these data the estimated total production for 1921 would be 98.20 per cent of the quantity, but only 58.2 per cent of the value of that for 1920.

As in the past, Ontario was in the lead with 4,718,537 ounces, or 72.08 per cent of the total production. British Columbia came next with 1,819,827 ounces or 27.80 per cent of the total. Silver contained in ores exported from Quebec, together with that in placer gold from the Yukon Territory amounted to 7,089 ounces or only 0.11 per cent. A small quantity, only 28 ounces in all, was recovered from Manitoba gold ores.

Zinc.

As indicated by smelter recoveries, the production of zinc showed a remarkable increase in comparison with the record for 1920. The shortness of demand and the slack metal market did not decrease the output. The Canadian production for the period was entirely derived from British Columbia, and was nearly all produced by the Consolidated Mining and Smelting Company principally from company-owned mines. During the past six months, neither Ontario nor Quebec produced any zinc.

The prices of all metals were held up to a fair and uniform price during the first nine months of 1920 when a simultaneous drop of about 40 percent occurred. As a result of this, with a total lack of market and the closing of United States smelters which formerly treated considerable amounts of Canadian ores, many small operators were compelled to discontinue for a time. The range of average yearly prices for the last four years on the St. Louis market, as published by the "Engineering and Mining Journal," were as follows: 1917, 8.730 cents; 1918, 7.890 cents; 1919, 6.988 cents; 1920, 7.671 cents. During the period reviewed the average price for the six months on the same market was 4.849 cents per pound. The New York quotations are usually one-half a cent higher, the difference being due to the freight charges. While the general trade in the metal has not been strong during the period it was noted that considerable sales were made, the paint and galvanizing industries absorbing fair amounts.

Of the total Canadian production of 28,236,103 pounds, the production of refined zinc by the Trail Smelters amounted to 28,218,000 pounds or 14,109 tons and it has been estimated that 18,103 pounds was recovered from zinc concentrates exported, an allowance of 20 per cent of the metal contents being made to cover losses in smelting.

At the average St. Louis price of 4.849 cents, the 28,236,103 pounds had a value of $1,369,168. The total production for the 12 months of 1920 was 39,863,912 pounds valued at $3,057,961. The figures for the period show, therefore, that this half-year's production represented 70.83 per cent of the quantity and 44.77 per cent of the value of zinc produced during the calendar year 1920.

The total imports during the 1921 period were valued at $201,958 as against $284,289 during the same period, 1920.

The exports showed a considerable increase for the half-year. From January to June, 1921, the total value of zinc and its products equalled $642,135 or almost six times the value of zinc exports for the same period in 1920.

Iron Ore.

The production of iron ore in Canada during 1921 will probably be the lowest on record. Of the large operating mines, the Magpie, operated by the Algoma Steel Corporation reported having made no shipments, although 42,198 tons of siderite ore was mined. The Moose Mountain magnetite mine was reported idle, and made no shipments. Only one small shipment was made from Ontario by the Wallbridge Mine which consisted of 20 tons ore mined in other years. Of the large operators in Nova Scotia the Dominion Iron and Steel Company and the Nova Scotia Steel and Coal Company reported no operations in Canada, although both firms mined iron ore in Newfoundland, producing during the period 334,102 tons of hematite averaging 5.15 per cent iron. Shipments amounted to 36,419 tons, part of which came to Nova Scotia, the balance being shipped to Europe.

N.B.—Since going to press a report has been received that 740 tons of magnetite ore averaging 60 per cent iron was mined and shipped from British Columbia.

Pig Iron.

Beginning with January, 1921, a monthly record of the production of pig iron and ferro-alloys in Canada has been obtained by the Bureau, and the data have been published in the Monthly Report on the Production of Iron and Steel. These monthly records do not show the values of the iron made, but the reports give in detail the grades produced, and as the iron producers follow the recognized markets in the United States, the outputs shown seem to supply all the information which is required for the guidance of the trade. More complete statistics will be prepared for the annual report.

Blast furnaces were operated during the period by

the the Algoma Steel Corporation at Sault Ste. Marie, the Steel Company of Canada at Hamilton, the Canadian Furnace Company at Port Colborne, the Midland Iron and Steel Company at Midland, in Ontario; and by the Dominion Iron and Steel Company at Sydney. All plants used imported iron ores.

At the end of June, six furnaces were in blast, three at Sault Ste. Marie, one at Hamilton and two at Sydney.

The average output of pig-iron of all grades for the six months' period was 52,000 long tons, the lowest monthly production being in April. The total for the period was 309,206 long tons, as compared with 449,810 tons in the same period of 1920. The output for the first six months of this year was, therefore, only about 69 per cent of the amount made during the corresponding period of 1920. Of the pig iron made, 249,008 long tons was produced from blast furnaces by firms for their own use in further processes of manufacture; 59,897 tons made in blast furnaces was produced for direct sale. Of the 301 tons of electric iron made during the period, 222 tons was made for use and 79 tons of iron castings was made for sale as such. An analysis of the pig iron output for the six months ending June shows that 71 per cent of the total was basic iron; 21 per cent foundry iron, and 8 per cent malleable iron. Coke was the only fuel used in the manufacture of pig iron in Canada during the period.

The production of ferro-alloys, including the several grades of ferro-silicon, and also spiegeleisen, amounted to 10,781 tons during the half-year.

Steel.

The total production of steel ingots and direct steel castings during the six months ending June amounted to 295,140 long tons, of which 284,197 tons was produced for use in further processes of manufacturing by the makers; the balance, or 10,943 tons, was made for sale. By far the greater amount of steel made was produced by the basic open hearth process, the total for this item amounting to 282,648 long tons, of which 280,839 tons was in the form of steel ingots and was used by the makers, and the balance, or 1,809 tons, in direct steel castings. Of this latter amount, 1,423 tons was made for sale, and 386 tons for the use of the producers. Electric steel production amounted to 10,938 tons, of which 9,585 tons was produced as direct steel castings, and 1,353 tons was in the form of ingots. Nearly eight thousand tons of the direct steel castings made from electric furnaces was marked directly as finished product. Very little acid open hearth steel was made during the six months' period, the amounts recorded being 239 tons of ingots made for further use, and 256 tons of direct in all. Converter steel production amounted to 1,059 tons, most of which was made for direct sale as steel castings.

The average monthly production of steel ingots and direct steel castings for the half year ending June 30, 1921, amounted to slightly more than forty-nine thousand long tons, the total output for the period being 295,000 tons. During the same months in 1920, the average production was ninety-one thousand tons, and the total, 547,000 tons. The monthly average for the eight-year period, 1907 to 1914, inclusive, was sixty-two and one-half thousand tons.

Asbestos

From a review of the statistics collected for the first six months of 1921, it is apparent that the asbestos industry is passing through a period of quietness. The present condition is attributed to the state of the asbestos market which, when compared to the activity displayed during 1920 has experienced a considerable falling off. The United States manufacturers have had difficulty in disposing of their output in European markets due to some extent to the rates of exchange between European countries and the United States, and partly to the slow revival of the building trades during the half-year. The majority of the mines were working with reduced forces for much of the time. Shipments during the latter part of the period were very low as compared with those of the first three months of the year which are usually the smallest months for production. However, towards the end of the period a more plentiful supply of labour was obtained and a livelier market opened up due to the increased activity of the building trades and the gradual absorption of stocks held by manufacturers.

The Canadian production was as usual from the deposits in the Eastern townships of Quebec. The amount of asbestos rock mined during the first six months of the current year was 1,101,201 short tons of which 988,446 tons was milled. The total mill output for the period was 67,783 tons. The weight of asbestos recovered per ton of rock mined and raised during the period amounted to 123 pounds, as against 109.1 pounds from the ore mined and raised in 1920 and 100.8 pounds per ton in 1919. The weight of fibre extracted per ton of ore milled during the period was 139 pounds. Sales were made to the United States, Canadian and European markets, and for the period included 42,680 tons of asbestos fibre valued at $2,708,338, the average value per ton being $63.45. Of the total sales mentioned above 537 tons was crude asbestos, grade 1 and 2, and had an average value of $768.60 per ton or a total of $412,737. As compared with final figures for the sales made during the calendar year of 1920, namely, 199,573 tons with a value of $14,792,201 the percentages are 21.38 per cent of the quantity and 18.3 per cent of the value.

Coal.

The output of coal from Canadian mines during the first six months of this year declined to 86 per cent of the amount produced during the corresponding period last year but was 5 per cent in excess of the output for the same period during 1919. With the exception of New Brunswick, none of the provinces showed an output equal to the 1920 record. New Brunswick produced 104 per cent of its 1920 output and the other provinces follow in the order named: Saskatchewan, 94 per cent; British Columbia, 91 per cent; Nova Scotia, 87 per cent; Alberta, 79 per cent.

The total value of coal shipped during the period amounted to $32,882,953 and the average selling price reported from the different coal-producing areas ranged from $2.43 a ton for lignite coal in Saskatchewan to $8.53 a ton for anthracite in Alberta. The average for the Dominion was $5.75.

Having regard to importations, Canada as a whole imported 10 per cent of the amount of anthracite coal brought in during the same period in 1920, and 132 per cent of the bituminous. Quebec was the only province which imported less anthracite during the six months than in the same period, 1920, but even then, that province imported 96 per cent of the anthracite coal received in the half-year of 1920, an increase of 12 per cent over the figures for 1919. Manitoba and the Head of Lakes imported 169 per cent of the 1920 quota of

anthracite; Noval Scotia, 140 per cent; New Brunswick, 128 per cent; Prince Edward Island, 108 per cent; and Central Ontario, 107 per cent. In every case also the figures show that more anthracite was imported during the past six months than in the corresponding six months in 1919.

BOOK REVIEW.

THE METALLURGY OF THE COMMON METALS. By Leonard S. Austin, formerly Professor of Metallurgy and Ore Dressing, Michigan College of Mines. Fifth Edition revised and enlarged. 6 by 9 inches 615 pages, with Index and 178 Figures. Cloth. John Wiley and Sons, Inc., 423 Fourth Avenue, New York, and Chapman and Hall, Ltd., London. Montreal, Renouf Publishing Co. Price $7, postpaid.

This fifth edition of "The Metallurgy of the Common Metals", by Prof. L. S. Austin, which has now been published has been rendered necessary by the radical changes and improvements which have been made in the metallurgy of the common metals—gold, silver, iron, copper, lead and zinc—since the issue of the fourth edition in 1913. Indeed, to bring this valuable book into harmony with present practice, and to ensure that the fund of information which it contains shall be up-to-date, it has been found necessary largely to re-write it.

In consequence of the revision which the work has now received, at the hands of Prof. Austin, its value, both for everyday use in actual practice and also as a text-book for the classroom, has been greatly augmented. It has been the author's avowed aim to set forth underlying principles clearly, and, at the same time, to give the details of methods and of metallurgical equipment, and their cost. Such information is unquestionably essential at the present time. For (as the preface to this edition states) owing to the rapid advance in prices, the costs of operation have lately been subject to serious modification. One chapter is devoted to the question of the cost of plant and equipment, and deals with this subject under the respective headings of costs of metallurgical plants, unit construction costs in 1914 and composite costs. It is stated that the costs in 1920 can be calculated as being double those given for the cost of plant as the latter were based upon figures of 1913 to 1915, when prices were comparatively stable, but that, "when the present abnormal labor costs again return to the older figures, then plant costs will be correspondingly decreased."

Indeed, the author emphasizes the fact that, "when prices of labor and supplies go down, then we may expect an increase in mining." He gives a chapter to the general economic situation as it affects the business of metallurgy, in the course of which he discusses the labor situation, in its relation to the mining industry. Organized labor, he says, has seized the opportunity of making "demands under pretence of needing a 'living wage', that is money enough to meet the necessities, but also many of the luxuries of life. Often the strikers have not cared whether they worked or not; a holiday would well suit them. As a result, capital, whose rewards depend upon uninterrupted operation, has lost seriously and the 'marginal mines'—by which expression are described those mines that, normally, can just pay their way—are having to shut down." After setting out, at some length, the shortcomings of the workingman, he gives it as his view that the employer's best plan is imitate the methods of the Union. The mining, smelting and milling industries should, he says, unite to (1) form a union to which all should liberally contribute, probably small and large alike, and (2) establish propaganda based upon exact and statistical information; and "finally, even as the Union man will strike and starve to gain his ends, so must the company do, confident that by lockouts a permanent improvement can be made. Where one or two out of many shut down, it is but fair that they should draw compensation from the general fund."

Owing to the advances being made in many districts, the chapters on milling practice already need some revision. The description of Canadian plants are in some cases not at all good. The book is nevertheless worth a place in the library.

DIRECTORY OF CHEMICAL INDUSTRIES.—

The Dominion Bureau of Statistics has just issued a second edition of the Directory of the Chemical Industries in Canada, listing the names, addresses and products of over eight hundred Canadian firms manufacturing chemicals, or other products in which the processes used are essentially dependent upon the agency of chemical change.

The first edition of this publication issued two years ago met with such a cordial reception that within a few weeks the entire supply was exhausted. Since then, the subject matter has been entirely revised and added to so that in the present edition nearly three hundred new names appear.

It has come to be a well accepted truth that scientific progress is essential to the true development and material welfare of any country, and in Canada, where many of our natural resources are as yet almost unknown, the importance of laying sound foundations cannot be over-estimated. Some of the possibilities of industrial chemical development were made apparent by the remarkable accomplishments along these lines in Canada during the war, and consequently popular sentiment now favours the idea that this country should, to a large extent, be freed from dependence upon other countries for our chemical needs. In order that this idea might be guided along well advised lines, it was essential that a survey of our chemical industries should be made, and the bulletin now referred to represents one phase of this work.

The Directory is in two divisions: (1) an alphabetical list of the various concerns, the head office address of each, together with a detailed list of their products, including in the latter chemicals and products resulting from chemical processes; (2) a list alphabetically arranged of the chemical products manufactured in Canada showing the names of the various firms engaged in their manufacture.

The Directory has been published in a limited edition, and as a great number of requests for copies have already been received, it is probable that the available supply will soon be taken up. Requests from those interested should be addressed to the Dominion Bureau of Statistics, Ottawa.

STAKING NORTH OF SHINING-TREE.

It is reported that gold discoveries are being made in the townships north of the Shiningtree area and west of Duncan lake. This is regarded as likely territory for discoveries.

The Third Annual Western Meeting of the Canadian Institute of Mining and Metallurgy

By T. B. WILLIAMS, Convention Secretary.

The Third Annual Western Meeting of the Institute was held in Macdonald Hotel, Edmonton, on September 14th, 15th and 16th, 1921. This was the first occasion on which an Annual Western Meeting was held in the city of Edmonton, and let it be recorded that the members of the Rocky Moutain Branch and the Northern Alberta Branch have demonstrated in no uncertain manner their capacity to stage a typical Annual Meeting in true western style and to carry it through with snap and vigor. The local committees are to be heartily congratulated upon the well merited success which crowned their efforts; and we are confident that all those in attendance will join with us in extending our appreciation of the instructive and pleasing program that was presented for our entertainment. To those who could not, and even to those who would not, attend we commend our brethern of Edmonton, and suggest that if they (who could not, or would not) would "know the west" they would be wise to accept all future invitations to the general meetings of the Institute in Western Canada.

The attendance of members and guests was 125. Mr. O. E. S. Whiteside presided in the absence of the President, Mr. C. V. Corless, who was obliged to proceed to England about the last of August.

Wednesday, September 14th.

The sessions were opened by an address of Welcome from Mayor Duggan, of the City of Edmonton, who, in the course of his remarks, stated that the Institute might consider itself in possession of the City, even to the extent of taking over the street car system. The Mayor was followed by the Hon. Mr. Greenfield, Premier of Alberta, who, in lamenting the fact that he was a mere farmer, made a characteristic and forceful speech emphasizing the fact that those who followed the industries of farming and mining were working together for the betterment of the country, and he trusted they would long continue these amicable relations in the cause of industry.

The Presidential address, which had already appeared in the September "Bulletin" was then read by the Secretary Treasurer, Mr. G. C. Mackenzie.

Mr. O. E. S. Whiteside was Chairman at the luncheon at the University of Alberta which was partaken of by about 80 of the members who were privileged in listening to an address by Dr. Tory, President, of the University of Alberta. This will be published in next week's Journal.

After luncheon the members were escorted by members of the University staff, viewing the University buildings. Considerable interest was manifested in the work of the Mining department, which, under the direction of Prof. N. C. Pitcher, is busily engaged in research problems in connection with the utilization of Alberta lignites. The members were also interested in Prof. Clark's experimental work in connection with road materials, and in his description of the difficulties that had to be surmounted in overcoming the evils of Bentonite.

The afternoon session commenced at 3.30, Prof. N. C. Pitcher, Chairman. Mr. Edgar Stansfield presented a paper entitled: "Standardization of Air Drying of Coals." This paper was followed by some lively discussion in evidence of the fact that the problem was of considerable interest to those in attendance.

Dr. K. S. Clark then gave a short talk on Road Making Materials in Alberta, illustrating his remarks with mixed samples of clay and clay and gravel which had been rendered impervious to moisture through the addition of approximately 5 per cent tar which had been extracted from the tar sands of Northern Alberta.

The Smoking Concert at the Macdonald Hotel was commenced at 8 P.M. under the able Chairmanship of Dr. J. A. Allan. This Smoking Concert was a decided innovation insofar as the experience of the Institute in entertainments of this kind, as it consisted almost entirely of music and songs contributed by local members. The quality of this entertainment was such that we fear no contradiction in stating that the professional artists, who have been engaged in the past for similar functions, were by comparison mere amateurs in vocal effort with the Welsh and Scotch members of the Northern Alberta Branch.

Suitable refreshments were served about half way through the program. Then followed a five minute talk by the Secretary-Treasurer on the Institute, after which the second half of the musical program was concluded and the Smoker broke up shortly after midnight by singing "God Save the King."

Thursday, September, 15th.

Chairman, Dr. Dowling.

The morning session was taken up entirely by ten minute talks on the Coal Fields of Alberta by the following members:—Lethbridge-Taber District,—by Mr. Moses Johnson. Canmore-Bankhead District,—by Mr. Lewis Stockett. Drumheller District,—by Mr. D. A. MacAulay and Dr. J. A. Allan. Edmonton-Clover Bar District,—by Mr. A. C. Dunn.

There was considerable interest taken in the coal mining districts under discussion, particularly that of Drumheller. It was pointed out by Mr. D. A. MacAulay, that there was a large amount of slack coal being wasted at the present time because of the lack of market, and that while the Drumheller operators had made application to the Lignite Briquetting Plant at Bienfait for a test run on Drumheller slack they were disappointed to learn that a Federal Order in Council prevented for the time being at least, the granting of their request. Some interesting discussion also took place on the possibility of mining the upper coal seam at Drumheller through mining of the upper. Dr. Allan expressed the opinion that there was very little danger of losing any large amount of coal because of mining methods already adopted, although his point of view was not altogether satisfactory to Mr. W. Shaw.

At 12.30 P.M. the members of the Institute were graciously entertained at the Macdonald Hotel, at luncheon by the Rotrary Club of Edmonton, and after the inner man had been provided for, the Institute members were introduced, one by one, by the Vice-President of the Rotary Club, Colonel Primrose. Then followed a Community chorus in which both hosts and guests joined most heartily. We think that the bright sunshine and transparent air of Alberta must be the

contributory cause of this delightful habit which Albertans have of singing on every possible occasion.

The Chairman then introduced the Hon. Mr. Greenfield, Premier of Alberta, who held the attention of all for ten minutes with a most interesting and informative speech regarding the aims and activities of the United Farmers of Alberta.

The Premier was followed by Dr. R. C. Wallace of the University of Manitoba, who proceeded to enlighten our hosts, the Rotarians, the Premier—and it may as well be admitted, some of our own members—as to what the Institute represented and what it was trying to accomplish for the betterment of the country and the industry of mining. Dr. Wallace emphasized the point that in this National Institute of Mining no section or class of the community was represented in preferment over that of any other class, but that the Institute constituted on organization in which the prospector, the miner, the engineer, the scientist, the business man and the capitalist could rub shoulders and work together for the betterment of all economic conditions affecting the mineral industry in Canada. The luncheon concluded by singing "God Save the King."

The afternoon session commenced at 2.30 P.M. Mr. John R. MacDonald acted as Chairman.

Mr. John McLeish of the Mines Branch, Ottawa, presented a semi-annual statement of mineral statistics compiled by the Federal Bureau of Statistics, Ottawa. Mr. McLeish's paper was followed by Dr. R. C. Wallace, who presented his paper on the "Control of the Mineral Resources of the Prairie Provinces." This paper proved most interesting to the members, and was followed by a lengthy discussion in which the leading part was taken by Thomas W. Gibson, Deputy Minister of Mines for Ontario, Dr. J. A. Allan, of the University of Alberta, and several other members. Then followed ten minute talks on Dominion mining legislation contributed by Mr. W. Dixon Craig, Prof. N. C. Pitcher and Dr. J. A. Allan. The speakers showed conclusively that existing regulations were poorly framed and required amending in the interests of the mineral industry. Some of the points raised by Mr. Dixon Craig and his colleagues illustrated the absurdities existing in mining regulations and caused much laughter.

The banquet held in the Macdonald hotel on the evening of September 15th, was a most enjoyable affair. It was as informal as is the great west itself, and because of that the eastern members quickly discovered that they were adopted, lock, stock and barrel, into the western family. The chair was occupied by Mr. O. E. S. Whiteside, who gave the toast to the King and read a telegram of regret from His Honor, the Lieutenant Governor, who was unable to be present. Mr. Whiteside then introduced the Hon. George Hoadley, Minister of Agriculture, who represented the Government in the unavoidable absence of the Premier. Mr. Hoadley made the suggestion that members of the Government would at all times welcome invitations to attend Institute meetings so that they might secure the helpful advice of mining men in regard to the administration of the mineral resources. Other speakers were the Honourable Chas. Stewart, who spoke on "The Undeveloped Resources of Western Canada" and promised his support in furthering the mining industry of Alberta; the Mayor of Edmonton, Mr. Duggan, and Mr. A. U. G. Bury, who lamented the fact that so wide a gulf separated art from mining.

Under the direction of Mr. Howard Stutchbury, a number of Community choruses were rendered, including the battle hymn of the Institute: "Drill Ye Tarriers, Drill" and that soul stirring lament "Gone are the days when we had our rock and rye". Several solos and duets were sung by Edmontonians: in fact the musical program was quite up to the high standard that had been set at the smoker. The banquet terminated at 11.30 P.M. with "God Save the King."

Friday, September 16th.

Chairman, Mr. Thos. W. Gibson.

The morning session was opened with the reading and discussion of Mr. George Sheppard's paper on "Recent Development work relating to Petroleum in Western Canada." This was followed by short talks on the "Geological Structure in Fort Norman District" by Dr. Dowling and Dr. Williams. The geologists present gave a touch of spice to the proceedings by indulging in a little warm debate concerning the work of the Canadian Geological Survey.

At 12.00 noon, the members assembled at the front of the Macdonald hotel for the purpose of having their photo taken, and were delighted to find that the Hon. Mr. Greenfield, Premier of Alberta was anxious to identify himself with the Mining fraternity by joining the group. After the photographer had done his deadly work the members were entertained at luncheon by the Edmonton Board of Trade, at which Mr. S. B. Woods, K.C., President, presided, and introduced as the principal speaker, Mr. Thos. W. Gibson, Deputy Minister of Mines for Ontario. In the course of his remarks Mr. Gibson spoke of the impressions he had received in travelling to Edmonton, and during his stay in that city. He reminded his audience of the vast coal resources of Alberta, comparing the mining industry of Ontario with that of the former province and concluded by stating that as long as the administration of Canadian public affairs remained in the hands of our best public spirited citizens he felt confident that all would be well with the Dominion.

Others speakers included Dean Fearnsides of Sheffield, England, and "Spike" Mackenzie.

Prof. Fearnsides gave a brief resume of his trip from the time he left the Old Country. He had been greatly impressed throughout the whole of his itinerary, and stated that "The Prairies were not as level as a table, as was generally supposed by the citizens of England." "The thing that impressed me most," said Prof. Fearnsides, "is the magnitude of your country. "We, in England, have a great variety of scenery in small patches, while yours is on a much grander scale. We might be said to deal in retail while you deal in a wholesale way."

Mr. Mackenzie was asked for for the Nth time to sing the war song of the Institute: "Drill Ye Tarriers, Drill." Our Secretary is about ready to blossom forth as a poet, because in singing this song he always has a new rendering. In his remarks he stated that he would return to the east to tell some of its wise men that they must stand at attention and be prepared to shake a leg, or they would be out-classed by the members of the west. In quoting Mr. F. W. Gray, former Editor of the Canadian Mining Journal, at a Canadian Club luncheon in Montreal, he said: "The day will come when there will arise in Alberta a bigger city and a bigger industry than there now exists in Montreal. This will inevitably follow the development of the coal resources in that part of the Dominion."

The afternoon session commenced at 2.30 p.m. Mr. Thos. W. Gibson, Chairman.

Prof. Wallace, convener of the Resolutions Committee, presented the following three resolutions which were carried:—

Resolved: That the Canadian Institute of Mining and Metallurgy in Western Session at Edmonton, express their appreciation to the Federal Minister of Mines and the Minister of Mines for Ontario that representatives from their Departments were present at the Edmonton meeting and made very material contributions to the success of the meeting.

Resolved: That owing to the great need for an office of the Geological Survey in Edmonton, the Canadian Institute of Mining and Metallurgy in session at Edmonton respectfully request the Minister of Mines to take steps to re-open the Edmonton office and place it on a similar footing to the office at Vancouver.

Resolved: That whereas the well-being of an industry is dependent upon the character of the law applicable thereto and whereas the law relating to the mining industry in Manitoba, Alberta, Saskatchewan and the North-west Territories is instable, and in need of revision;

And whereas this Institute did in past years vigorously press upon the Government the desirability of the enactment of a Dominion Mines Act.

The members of the Canadian Institute of Mining and Metallurgy assembled in the Third Annual Western Meeting of the Institute do hereby resolve that the Institute should commence and carry forward such proceedings as the Council may deem advisable to effect the enactment of a Dominion Mines Act;

And it is further resolved that pending the attainment of the above object the Council do appoint a special committee to investigate the present mining regulations and bring in a report thereon for the next annual meeting.

Mr. Emerson and Mr. Robert presented the following resolution of condolence to be forwarded to the widow of the late Mr. W. P. Williams.

Resolved: That in the death of Mr. W. P. Williams, the Canadian Institute of Mining and Metallurgy has lost a valuable member whose calling away is a serious loss to the mining industry of Western Canada, and that this meeting extend to his widow and family the sincere sympathy of the Institute for them in their great bereavement and also that a copy of this resolution be forwarded to the widow and family and that same be embodied in the minutes of the Western Annual Meeting.—Carried.

Professor Wallace moved and Dr. Ferrier seconded a vote of thanks and appreciation to the Western Members for the success of the entertainment that had been provided.

Mr. Whiteside mentioned the fact that it was the members of Edmonton and vicinity, especially, who were responsible for the success of the Convention.

Dr. Allan, Vice-President of the Northern Alberta Branch replied that a large portion of the success arose from the papers and discussion by outsiders. Mr. Dunn seconded Dr. Allan's remarks, but stated that members present were keenly appreciative of the work accomplished by our Convention Secretary. Mr. T. B. Williams, who for the past six weeks had been working 16 hours a day and had really borne the burden of the Convention, and that a hearty vote of thanks should be accorded to him. Mr. Dunn's motion was seconded by Mr. Gibson, and carried.

On motion of Dr. Allan, seconded by Mr. Shaw, the meeting adjourned at 3 p.m.

On Friday evening, the 17th, about 55 members of the Institute entrained in standard sleepers at Edmonton and were taken via: Canadian National Railways to what is locally known as the "Coal Branch" of the C. N. R., just east of Jasper, where the members were entertained and shown various phases of this new coal field by the officers of The Cadomin Coal Company, the Sterling Coal Company, and the Yellowhead Coal Company. More complete details of this trip will appear in later issues of the Bulletin. The thanks of all those who took part in this most delightful excursion are due to the Edmonton Railway officials and more especially to the officers of the various coal companies who received and entertained the visiting members in a most warm hearted manner.

A full report of the proceedings of the Edmonton meeting will appear in the next issue of the Journal.

HIGH GRADE ORE AT MAYO.

James O. Greenan, engineer with the Yukon Gold Corporation at Mayo, is quoted as stating that sufficient work has been done in the Keno Hill Section of Mayo District to assure the production of high grade ore for several years. Nothing, however, has been uncovered to warrant the prediction that such ore will be available in quantity for a longer period. The Yukon Gold Corporation has done several thousand feet of development work and is proceeding as fast with these operations as its facilities permit. Twenty-five hundred tons of high grade ore have been shipped this year by the Corporation. Shipments are being made via St. Michael to the Shelby Smelter at San Francisco, Cal., a distance of 5,000 miles, the greatest distance any mine in the world is transporting crude ore for treatment. Through a special arrangement with the Canadian Government, Mayo has been made a sub-port of entry, thus permitting vessels to load ore direct at that point and carry it to St. Michael. Ore is now being mined for transport during the winter, over the snow and ice to Mayo. When navigation opens next year this will be taken out, as is now being done with that which was mined last winter. The Yukon government now has a crew of men improving the road so that the transportation problem will be made somewhat simpler. Mr. Greenan says that there is a shortage of hard rock miners in the Mayo District, that wages are $5.00 a day with board and lodging, and that many prospectors are being attracted from other parts of the Territory.

COAL BY CHEAP WATER ROUTE.

Soft coal, in large quantities, is being imported into Montreal by the cheap water route by the British Empire Steel Corporation. No coal was brought in, last year, in this way, but the company's coal carriers, known as the Black Diamond Line, have unloaded more than 500,000 tons, so far, this season. Mr. J. E. Cookson, of the British Empire Steel Corporation, stated last week, that, owing to the over-production in the United States, that country is now dumping soft coal into other markets at the low price of $2 a ton at the pit mouth, and selling it at that price, plus the freight charges, at Montreal and along the Great Lakes shores.

Bring the Mining Industry to Public Notice

A better Understanding of the Mining Possibilities Would Lead to Greater Utilization of Our Mineral Resources.

By J. J. O'CONNOR.

If there is one thing more than another, in connection with the resources and development of this Province, that requires to be impressed upon governments, the so-called interests, the farming interests, the manufacturing and business interests, and the man on the street, it is the magnitude and importance of the mining industry, and its relation to the upbuilding and maintenance of a prosperous industrial future for this section of Canada. Little understood by the average man, it is apt to be looked upon as, at best, a gamble, something into which one may safely put what he is prepared to lose, or, as in some cases, in the hopes of getting-rich-quick at small outlay. Mining has advanced at such a rapid rate, and is now on such a substantial basis as a going concern, that confidence may be felt in its stability and permanence. Sufficient has been proven in Northern Ontario, to convince the most skeptical that we have mineral wealth almost beyond computation. The expectations and predictions of the most experienced geologists, mineralogists and mining men, have been far exceeded during the past ten years. Portions of this Province that were unknown and untrodden wildernesses twenty years ago, are today hives of industrial, business and mining activity, affording employment to thousands in the various lines of endeavour.

This change in the mining status, has been brought about mainly by the character of the pioneer mining men engaged in this development, some of whom have passed to their reward, but whose names will be permanently associated with the story and romance of the phenominal results achieved from their early, persistent, and sane optimism. Undeterred by the obstacles and difficulties that beset such undertakings, both physical and financial, they plodded on until they reached the climax of success and blazing the trail for the prospector into new fields, until now the productive area of Northern Ontario has extended to the proportions of a Kingdom, the confines of which are as yet unknown, and unbounded.

Twin Cities Likely Point.

The same energy and intelligent application of methods, that has made such a pronounced success of gold, silver and nickel that has brought Northern Ontario into a ranking world class as a producer of these metals, applied to the iron ore industry, will build up an iron and steel industry, that will place Canada in an independent industrial position. There is every confidence in the minds of men, informed as to the iron ore resources of Northern Ontario, that such an industry will be established in the near future. Just where that enterprise may be undertaken, is a matter of secondary consideration. The enormous deposits tributary to the Canadian National Railway, and the head of the lakes, point to the twin cities as the most likely point. The geographical position is admirable, being, roughly, one thousand miles nearer the growing western market, than any common shipping point in eastern Ontario, affording substantial advantages in the matter of transportation, which is at the base of all industry, and a paramount governing factor in all manufacturing undertakings.

Kind of Publicity Needed.

There would seem to have been a lack of the right kind of publicity, propaganda if you will, in impressing this on governments and the public. The governments both Federal and Provincial, are the wardens of a great estate. The men whose daily intercourse brings them into touch with the possibilities of that estate, have a duty to perform, in bringing these possibilities to the notice of governments, in the most forcible kind of way. The cares and responsibilities of government, do not permit an intimate knowledge of the requirements necessary to the full and complete development of the country's resources, therefore, those people engaged in the mining industry have a responsibility placed upon them to bring the mineral possibilities to public notice, to the end that they may receive their due.

The Canadian National Exhibition affords one of the finest mediums for this purpose. Were an exhibit placed there that would do justice to the actual and prospective possibilities, it would be viewed by a million people, and have a lasting effect on the minds and serve to correct the all too prevailing idea that mining is a gamble.

Display by Larger Operators.

While the prosperous and productive mines of Northern Ontario are independent of all outside aid in their own spheres, yet they are concerned in the general prosperity of the mining industry, and anything that will aid it, is distinctly in their interest. Therefore, it would be well if the larger operators in gold and silver, would make such a display, at not only the C. N. E. at Toronto, but at the principal fairs throughout the Province. This would do more than anything else to educate the public to the importance of our mineral wealth. No one in this country is more directly interested in mining than the farmer, although he may not know it, until the fact is brought to his notice that it provides one of the most profitable outlets for his produce. Mining machinery should also be in evidence at these fairs. Nothing is more impressive than the means by which the values are extracted from the ores, and the country's wealth laid bare.

A Popular Policy Suggested.

The shocking fact, that, notwithstanding our extensive deposits of workable iron ore, there is not one pound of iron being raised from the ground to-day, throughout the whole of Canada, should arouse both governments and people to the pressing urgency of the iron situation.

Emergency Tariff Bills, Fordney Bills, and the trade situation generally, demand that something be done to remedy present conditions, and make Canada self sustaining in the matter of iron and steel.

The most popular plank that could be placed in the platforms of the various parties and groups, that are about to appeal to the country for support, in the forthcoming general election, would be one for a de-

termined, and business like policy for the exploitation of our mineral wealth.

Such a policy would not only appeal to the thinking electorate, but would do more to stabilize exchange, solve the railway and unemployment problems, and cause agriculture and industry to go hand-in-hand, than any other policy that may be adopted.

In this connection, it may be said that our vast mineral and water-power resources are of sufficient magnitude and importance, to warrant the Federal Government erecting a separate Department, under a responsible Minister, who would care for and administer these twin industries. The Province of Ontario, together with other provinces of our confederation, have established the precedent. Why not the Federal?

40,000 TONS RAIL ORDER.

Phila.—Algoma Steel Mills, of Lake Superior Corporation have received an order for 40,000 tons of steel rails from Canadian National Railway. This together with recent order for 25,000 tons of rails from Canadian Pacific, will assure activity in the rail department of steel plant for the balance of the year. The outlook for business is regarded by the company as having distinctly improved.

DIAMOND DRILLING AT GOLD ISLAND.

Exploration work is being carried on by Pittsburgh people at Gold Island, Night Hawk Lake. Mr. J. Callighan is interested in the property.

EASTERN RAND IS PROMISING SOURCE OF GOLD

In an article on The Transvaal's Gold Outlook in this week's issue of "Barron's" R. Mabson, formerly editor of the London Statist, and author of annual review and text book, "Mines of the Rand," points out that although what is known as the "Old Rand," of the South African gold fields is giving indication of smaller annual yield, during the past 12 or 15 years value of the long, previously ignored extension of the gold region to extreme east of the 41 miles of the "Old Rand" lines of mines has come to be recognized, giving promise of great potential output in future years.

"The once despised Far Eastern gold field," he says, "has made great strides in the past ten years. The area contains at varying depths what may be described as half a dish like deposit of flat ore body that over 200 square miles—of average 10 miles from east to west and 20 miles from north to south—is workable to the depth of 5,000 feet, and all the score of shafts sunk by a dozen companies to the present time have intersected reef at less than 5000 feet from surface. The area contains not only zones of good ore but also extensive area where reef has not proved to be payable. As a whole the payable zones have proved to contain far better average grade and width of ore than the ore of the old Rand."

LA ROSE.

According to reports from Cobalt some very good ore is being developed by the La Rose mining company at the Violet mine. High grade and good milling rock are being opened up.

PALATINE MINING AND DEVELOPMENT CO'S. ENTERPRISE.

By J. J. O'CONNOR, Port Arthur.

Robert E. Hogan, representing the Palatine Mining & Development Company, the purchasers of the Atikokan Iron Company's blast furnace at Port Arthur, has arrived in the city, and has opened offices at the furnace plant. He announced officially that all matters pertaining to the acquirement of the blast furnace, from the former owners, had been closed, and that negotiations with the Canadian National Railway management had been satisfactorily concluded, whereby his company are to rebuild that portion of the P. A. D. & W. Railway, between North Lake and Gunflint, a distance of sixteen miles, and from Gunflint to the Paulson Mine, in Cook County, Minnesota, a distance of five miles, twenty-one miles in all. The Palatine Mining and Development Company will operate this portion of the railway under a ten year lease from the Canadian National Railway. The latter company has undertaken to relay with eighty-pound steel, and otherwise put in shape that portion of the P.A.D. & W. Railway between its junction with the C.N. Railway main line, and North Lake, and to have it completed and ready for heavy traffic in two months. In addition to the new steel, this undertaking entails the relaying of the entire distance with new ties, the construction of new bridges, and a general lining up of the road-bed.

Mr. Hogan gave out the statement that the mining company would be in readiness to begin the shipment of iron ore over the railway, on the completion of the above undertakings, and that at least two, and probably more, trains of ore would be sent over the road daily.

The daily capacity of the furnace will be 500 tons of ore, when the enlargement now underway is completed. It is the intention of the company to have a large reserve of ore in stock-pile at the furnace.

That portion of the railway between North Lake and Gunflint skirts on the shores of lakes for the entire distance, instead of building construction camps, for the accommodation of the men on construction work, the Palatine M. & D. Co. have constructed house-boats on scows, that may be conveniently moved from point to point, as the work proceeds. Labour is plentiful, at thirty-five cents per hour, with board and lodging at one dollar per day. It is the intention to have this enterprise fully underway by July 1st next.

PATRICIA IN KENORA MINING DIVISION.

The western part of Patricia is now part of Kenora Mining Division.

The Order-in-Council respecting Patricia is:

"Upon the recommendation of the Honourable the Minister of Mines, the Committee in Council advise that owing to important discoveries of mineral reported from that part of the District of Patricia, lying north of Kenora, and for the convenience of prospectors and the public generally, the following territory, namely, all and singular that certain parcel or tract of land and premises, situate, lying and being in the District of Patricia, Province of Ontario and consisting of the most westerly portion of the said district, more particularly described as follows:

"Commencing where the boundary line between the Districts of Thunder Bay and Kenora intersects the southerly shore of Lake St. Joseph; thence extending north astronomically 315 miles more or less to the northern boundary of the District of Patricia being the Inter-Provincial Boundary between the Provinces of Ontario and Manitoba; thence south-westerly and southerly following the said Inter-Provincial Boundary to the north boundary of the District of Kenora, thence in a general course easterly following the said northerly boundary of the District of Kenora through Winnipeg River and Portage to Lake St. Joseph and the southerly shore of Lake St. Joseph to the point of commencement:—be added to, and form part of the Kenora Mining Division, as and from the 6th day of August proximo."

COPPER WILL COME BACK.

William A. Paine, president of the Copper Range company, after a recent visit to the company's Michigan mines said: "One must not lose faith. Copper always has been a necessity in industry and will continue to be. Copper must and will come back, stronger than ever." Mr. Paine would venture no opinion as to whether or not there will be a general resumption of mining operations this year. He commented, however, on the fact that the biggest producers of copper discontinued output to remedy the dislocation between supply and demand, and that June was practically the first month in which the effect of the mine shut-down was noticeable to any extent so far as decrease in production of refined metal is concerned: no improvement has yet been shown in demand. On the other hand, it will take at least four months, after the mines resume, to bring refinery production up to normal figures. Copper consumption, Mr. Paine believes, largely depends on the return of general prosperity. Approximately 70 per cent of the business now being done by the rolling-mills is with the automobile industry, which goes to show the extent of the depression in other industries which normally use large amounts of copper.

SCOTIA'S NEW COLLIERY.

Excellent progress is being made in the development of No. 7 colliery, the newest of the Scotia Company's chain of coal producers. The sod was broken for this colliery in September, 1920, simultaneously with the closing down and dismantling of the Scotia colliery, which became worked out. No. 7 is in the vicinity of the old Scotia, so that the men who formerly worked at the Scotia colliery were transferred to No. 7 thus continuing them at work at a convenient distance from their homes. The first coal was hoisted from No. 7 in October last. The mine is now giving an average daily output of 400 tons. Rapid work has been done in bringing the new colliery into line as a substantial producer of coal.

The mining is done by machines and not only is the mine very well laid out for economical capacity production, and convenient working but the mechanical equipment is excellent. The seam is about five feet thick, and the coal of splendid quality.

This opening is one of the most important advances made in the Sydney Mines coal field during the regime of Alex S. McNeil as general superintendent, after whom the new opening has been named "Alexander Mine".

The Canadian Miners' Buying Directory.

Acetylene Gas:
Canada Carbide Company, Ltd
Prest-O-Lite Co. of Canada, Ltd.

Acetylene Welding:
The Toronto Iron Works, Ltd.

A.C. Units:
Powley & Townsley, Limited.

Agitators:
The Dorr Co.
Can. Chicago Bridge & Iron Co., Ltd.
Horton Steel Works, Limited.

Air Compressors:
Belliss & Morcom, Ltd.
Laurie & Lamb

Air Hoists:
Canadian Ingersoll-Rand Co., Ltd
Mussens, Limited.

Air Receivers:
The Toronto Iron Works, Ltd.

Alloy and Carbon Tool Steel:
Peacock Brothers Limited.

Alternators:
MacGovern & Co.

Aluminium:
Spielman Agencies, Regd.

Amalgamators:
Northern Canada Supply Co.
Mine and Smelter Supply Co.
Wabi Iron Works.

Antimony:
Canada Metal Co.

Antimonial Lead:
Pennsylvania Smelting Co

Assayers' and Chemists' Supplies:
Dominion Engineering & Inspection Co.
Lymans, Limited
Mine & Smelter Supply Co.
Pennsylvania Smelting Co.
Stanley, W. F. & Co., Ltd

Ash Conveyors:
Canadian Link-Belt Company

Ashes Handling Machinery:
Canadian Link-Belt Co., Ltd.

Assayers and Chemists:
Milton L. Hersey Co., Ltd.
Campbell & Deyell
Ledoux & Co.
Thos. Heys & Son
C. L. Constant Co.

Asbestos:
Everitt & Co.

Balls:
Hull Iron & Steel Foundries, Ltd.
Peacock Brothers Limited.
The Wabi Iron Works.
The Hardinge Conical Mill Co
The William Kennedy & Sons, Ltd.

Ball Mills:
Hardinge Conical Mill Co.
Hull Iron & Steel Foundries, Ltd.
The Wabi Iron Works.
The William Kennedy & Sons, Ltd.

Babbit Metals:
Canada Metal Co.
Hoyt Metal Co.

Ball Mill Feeders:
Hardinge Conical Mill Co.
Hull Iron & Steel Foundries, Ltd

Ball Mill Linings:
Hardinge Conical Mill Co.
The William Kennedy & Sons, Ltd.
Peacock Brothers, Limited
Hull Iron & Steel Foundries, Ltd

Belting—Leather, Rubber and Cotton:
Canadian Link-Belt Co., Ltd.
The Mine & Smelter Supply Co.
Northern Canada Supply Co.
Jones & Glasco.

Belting:
R. T. Gilman & Co
Gutta Percha & Rubber, Ltd.

Belting—Silent Chain:
Canadian Link-Belt Co., Ltd.
Hans Renold of Canada, Limited Montreal
Jones & Glassco (Regd.)

Belting (Transmission):
Goodyear Tire & Rubber Co

Belting (Elevator):
Goodyear Tire & Rubber Co

Belting (Conveyor):
Goodyear Tire & Rubber Co
Gutta Percha & Rubber, Ltd.

Bins and Hoppers:
The Toronto Iron Works, Ltd.
Can. Chicago Bridge & Iron Co., Ltd.
Horton Steel Works, Limited.

Blasting Batteries and Supplies:
Canadian Ingersoll-Rand Co., Ltd
Mussens, Ltd.
Canadian Explosives, Ltd.
Powley & Townsley, Limited.

Bluestone:
The Consolidated Mining & Smelting Co
The Coniagas Reduction Co., Ltd.

Blowers:
Canadian Fairbanks-Morse Co., Ltd
Northern Canada Supply Co.

Boilers:
Canadian Ingersoll-Rand Co., Ltd
Marsh Engineering Works
R. T. Gilman & Co.
The John Inglis Company
Wabi Iron Works.

Blue Vitriol (Coniagas Brd):
Canadian Fairbanks-Morse Co., Ltd.

Bortz and Carbons:
Diamond Drill Carbon Co.

Boxes, Cable Junction:
Standard Underground Cable Co. of Canada, Ltd
Northern Electric Co., Ltd.

Brazilian Rough Diamonds:
Diamond Drill Carbon Co.

Brazilian Mica:
Diamond Drill Carbon Co.

Buggies, Mine Car (Steel)
Hendrick Manufacturing Co.

Brazilian Balias:
Diamond Drill Carbon Co.

Brazilian Rock Crystal:
Diamond Drill Carbon Co.

Brazilian Tourmalines:
Diamond Drill Carbon Co.

Brazilian Aquamarines:
Diamond Drill Carbon Co.

Bridges—Man Trolley and Rope Operated—Material Handling:
Canadian Mead-Morrison Co., Limited

Bronze, Manganese, Perforated and Plain:
Hendrick Manufacturing Co.

Buckets:
Canadian Ingersoll-Rand Co., Ltd.
R. T. Gilman & Co.
Hendrick Manufacturing Co.
Canadian Link-Belt Co., Ltd.
Marsh Engineering Works
Mussens, Ltd.
MacKinnon Steel Co., Ltd.
Northern Canada Supply Co.
The Wabi Iron Works

Buckets, Elevator:
Canadian Link-Belt Co., Ltd.
Hendrick Mfg. Co.
Peacock Brothers Limited.

Cable—Aerial and Underground:
Canada Wire & Cable Co.
Northern Canada Supply Co.
Standard Underground Cable Co. of Canada, Ltd
Peacock Brothers, Limited

Cableways:
Canadian Mead-Morrison Co., Limited
Fraser & Chalmers of Canada, Ltd.
Mussens, Ltd.
The Wabi Iron Works
R. T. Gilman & Co.

Cages:
Canadian Ingersoll-Rand Co., Ltd., Montreal, Que
Northern Canada Supply Co.
Fraser & Chalmers of Canada, Ltd
The Electric Steel & Metals Co.
The Mine & Smelter Supply Co.
Mussens, Ltd.
The Wabi Iron Works

TORONTO COAL PRICES.

Toronto, 21st Sept. — As regards the bituminous situation, there is a little more business being placed just now, but not in sufficient volume to afford strength to the market. The price of slack, which continues somewhat scarce, is from $1.60 to $1.90 at the mines. That of lump is from $2.25 to $2.75, according to quality and district, at the mines. The cold snap of the last few days seems to have aroused the householder to some fuller sense of the necessity of getting in his supply of anthracite, while yet there is time. Coal men say that orders for domestic fuel are now coming thick and fast—but there is still a whole lot of leeway to make up.

WACHMAN ORE EXHIBIT.

The Wachman Mining & Milling Company have set an example that might well be followed by other mining operators, by making an exhibit of their ores at the Thunder Bay Agrienltural Society's Fall Fair, now being held at the Society's grounds between Port Arthur and Fort William.

The samples shown are by no means picked ones, but represent a fair average of the ores taken at intervals from the collar of the shafts, down to a depth of 100 feet in shaft No. 2, and to a depth of 50 feet in shaft No. 1.

Visitors to the Fair were treated to panning exhibitions every hour, from the ore on view, in order to demonstrate the values contained therein. Very little mineralization is to be seen in the ore. There are small quantities of chalcopyrites, and some iron pyrites. In the bulk of the ore shown, no mineral whatever is to be seen. While the panning exhibitions were in progress, the writer saw tails of gold colour two inches long, panned from small samples of what appeared to be absolutely barren quartz.

The main vein, on which the development work is being done, has a surface width of from 4" to 3', and outcrops on K-646 for a distance of 1,060 feet. No. 1 shaft is 5 x 6 feet, and is down 50 feet. No. 2 shaft is the same size, and is down 100 feet. Drifting has begun at the 100 foot level, to connect the shafts.

A PRECEDENT WORTH FOLLOWING.

A new ceramic laboratory, in which investigative work regarding the clays of the Northwest will be conducted, is to be installed at the Northwest Experiment Station of the United States Bureau of Mines on the campus of the University of Washington at Seattle.

COMFORT-KIRKLAND.

A contract has been left for the sinking of a shaft on the Comfort-Kirkland property at Kirkland Lake. The shaft will be sunk to a depth of 150 ft. and exploration crosscuts run at that level to pick up extension of the veins on Ontario Kirkland. Local capital is interested in this enterprise.

LEBEL AND GAUTHIER.

Good reports of results of exploration work east of Kirkland Lake are coming to Toronto. This area is regarded as a promising one by many who have visited it.

TORONTO MINING QUOTATIONS.

Quotations on Active Stocks on Standard Stock Exchange on 20th September, 1921.

Silver.	High.	Low.	Last.
Adanac Silver Mines, Ltd.	1½	1⅜	1½
Beaver Consolidated	26	25	26
Chambers-Ferland	4	4	4
Coniagas	1.60	1.60	1.60
Crown Reserve	10½	10	10½
Foster	2	2	2
Gifford	¾	¾	¾
Great Northern	1½	1½	1½
La Rose	31	27¼	31
Mining Corp. of Can.	1.05	1.00	1.05
Nipissing	5.25	5.15	5.15
Peterson Lake	4¾	4¾	4¾
Trethewey	12½	11½	12
Wettlaufer	1	1	1
Gold.			
Atlas	17	15½	17
Dome Extension	65	65	65
Dome Lake	8	7¼	7¼
Dome Mines	19.50	18.65	19.50
Gold Reef	2⅜	2¼	2¼
Hollinger Cons.	7.45	7.35	7.40
Keora	7¾	7	7¾
Lake Shore M. Ltd.	1.34	1.27	1.34
McIntyre	1.96	1.93	1.95
Moneta	12½	9	9
Newray Mines, Ltd	4¾	4¾	4¾
Porcupine Crown	18	16	16½
Porcupine Tisdale	2	2	2
Porcupine V.N.T.	19	18	18½
Preston East Dome	2¾	2⅝	2¾
Schumacher	22	21½	22
S. Keora	15	15	15
Tech-Hughes	16	15	16
Thompson Krist	4	4	4
West Dome	8	8	8
West Tree Mines Ltd.	4¾	3½	4
Wasapika Gold M. Ltd	5	4	4¼
Miscellaneous.			
Petrol Oil	25	20	25
Vacuum G.	4½	4½	4½

METAL QUOTATIONS.

Following are the fair average prices for ingot metals (in less than car-loads):

Toronto	Cents per lb. 21st Sept. (Unchanged since last week).
Copper, Electric	17
Copper, Casting	16¾
Tin	35
Lead	6¾
Zinc	7½
Aluminum	27
Antimony	9

MINERS' DELEGATES AT INDIANAPOLIS.

Miners' delegates from the coalfields of the United States of Canada and the United States are meeting in convention at Indianapolis this week. Interest in this convention of the United Mine Workers of America centres around the demands in respect of wages, which the miners of the bituminous and anthracite fields will submit to the operators to replace the present agreement, which will expire on the 31st March next.

EDITORIAL

POWER FOR THE GOLD MINES.

At the annual meeting of shareholders of McIntyre-Porcupine Mines Ltd., it was announced that tentative arrangements have been made for the quick installation of an auxiliary steam plant, should one be found necessary. Evidently, the experience of last winter is not to be repeated, if preparedness can prevent it.

Then the shortage of power came very unexpectedly and the mining companies had little time to find substitutes for water power. It was thought probable that one or two of the companies would develop new water-powers this summer, but this has not yet been done. The Hollinger and McIntyre companies both acquired rights to develop and did some preliminary work, but are not yet ready to meet shortage by use of their own water powers. It is evident from the statement given out at the McIntyre meeting that the power problem is still a matter for serious concern at Porcupine, but that those interested are fully alive to the situation.

To a considerable extent, the production of gold next winter will be influenced by the amount of rainfall during the next two months. Ordinarily, we have a considerable fall of rain in Northern Ontario at this time. Last year we had very little and a water shortage resulted. The present summer has been a long, dry one, and, if this kind of weather is not soon succeeded by wet weather, there will again be a shortage of water. The mining companies in former years gave little attention to the water supply, leaving that to the power companies. During the past year, however, they have had good reason to be concerned about the weather, and have, doubtless, made plans to meet a possible shortage of water.

The development of water powers to meet the needs of mining districts has not lagged far behind development at Northern mines. At Porcupine, there has been some misunderstanding as to the needs of the mining companies and the amount of power which the power companies could supply. Increased requirements and low water supply came together last winter, and the mining companies were forced to curtail production. This curtailment meant, for the mining companies, a very large reduction in profits. It was not surprising, therefore, that two of the mining companies made plans for development of their own water powers. The postponement of this work evidently does not mean that—it will not be undertaken, but it has been taken to indicate that the danger of shortage this winter is not great. The McIntyre statement shows that there is again likely to be a shortage of power which will necessitate the use of auxiliary power at higher cost, and will make rapid expansion of operations inadvisable. The mining companies will be in a better position to meet a water power shortage this winter than they were last year. The managers have given the problem much attention and are, doubtless, armed for trouble. The shareholders can, however, do no harm by praying for rain.

DEFLATION OF LABOR.

Mr. Daniel Guggenheim, questioned as to the copper situation, on his recent return from Europe, stated that there would be no attempt made to increase production until there were more orders in sight. He stated that increased building activity would result in a demand for copper, but that high labor costs were retarding building. He remarked that labor leaders should teach their followers that deflation must take place in wages as well as in prices, or the industrial situation is disarranged and dissatisfaction to all concerned is the result. "Labor is entitled to a higher rate of pay than it had in 1911, but for most occupations a lower rate is necessary to bring wages in line with prices of materials and products."

Mr. Guggenheim is connected with many enterprises and he is opposed to deflation of labor by closing factories and throwing men out of work. He is, however, convinced that production cannot be resumed on a

normal basis until the workers themselves make an effort to meet the situation. Evidently, he finds conditions in the United States and Europe quite similar to those which prevail in Canada.

If the workers in the building trades would accept more reasonable wages there would be much more building going on and the resulting demand for mine products would make more work for miners. The folly of the workers in one industry is unfortunately disastrous to the workers in another industry. Instead of supporting claims for high wages in other lines, leaders of labor must consider whether more reasonable wages would not be better for everyone. The high wage rate is not a benefit to the workman, if he cannot find an employer who can make use of his services.

STAMPS AND BALL MILLS.

That the stamp mill should be eliminated is the opinion expressed by Mr. H. S. Denny in the "South African Mining and Engineering Journal." Mr. Denny has long championed stage crushing and stage grinding. He believes the elimination of the stamp mill would bring within the bounds of commercial possibility many millions of tons of ore that could only be worked at a loss by existing Rand methods.

Mr. Denny would find many here who would agree with him. Ball mills have found favor in Northern Ontario and are found in nearly all new plants. There is difference of opinion as to whether the advantages gained warrant change being made, but the tendency is towards elimination of stamps. As to whether Mr. Denny's opinions regarding the results to be obtained in South Africa are sound or not we do not know; but we do know that ball mills are popular in Northern Ontario.

Questioned concerning the relative merits of the two methods of crushing and grinding, a well known metallurgist remarked that, while the ball mill has many advantages, the stamp mill has advantages that will enable it to retain a position for certain work, despite rude crowding by the hungry and efficient ball mills.

THE TEMISKAMING MINE.

According to the president of the Temiskaming Mining Co., the reopening of the company's silver mine at Cobalt will not be undertaken unless silver commands a considerably higher price than has been obtainable during recent months. This does not mean that the mine will not again be a producer, for there are indications that better prices for silver are already in view, but it means that Temiskaming shareholders must for the present regard their company's shares in the Blue Diamond mine as the chief value behind the Temiskaming shares.

The Temiskaming mine has had a full share of the ins and outs of metal mining. It is now definitely out until the market for silver improves. It is, however, quite likely to be a producer again, if the market continues its present course. It is of less importance to shareholders, however, than is the Blue Diamond coal mine.

THE OUTLOOK FOR SILVER.

The price of silver is always a matter of great importance to companies operating at Cobalt, but at present it is of very vital interest because it shows signs of rising to a point which will make the reopening of more mines possible. It is not easy to obtain facts which allow one to judge of the future behavior of the silver market, or to estimate the importance that should be attached to published opinions. It is worth noting, however, that there has been recently a more cheerful tone in the reports on silver markets and an apparent belief that better prices will prevail.

FILMING THE MINING INDUSTRY.

The U. S. Bureau of Mines has, by co-operating with companies interested in the industry, succeeded in having made a large number of films which picture work in mines and smelters. The Bureau had not the funds for undertaking the task of making the kind of films that were wanted, but succeeded in arranging with operating companies for over $100,000 worth of films during one year.

The Bureau detailed one man to supervise the work. He found a film maker who devised the special apparatus necessary, and named prices for the work proposed. The Bureau then approached mining companies and invited them to have films made. The response was generous and many films have been secured and are used for educational purposes.

In Ontario some good films have been made for mining companies and for the Department of Education. It has been found, however, that the public displays little interest in industrial pictures. The educational value of such pictures can be much increased by weaving a human interest story into the picture. As a background for a story a mine or smelter picture will attract much attention, while without the story it may be quite uninteresting to the average assembly.

EDITORIAL NOTES.

Under the Pittman Act the United States purchases silver from domestic producers at the fixed price of $1 per ounce. Some enterprising individuals have purchased silver in the open market and endeavored to sell it to the Government.

* * *

The plea of Mr. O'Connor for more geological workers in Northern Ontario will meet with approval. The small staff of the Department of Mines does good work, but cannot cover the ground as quickly and thoroughly as the industry demands.

The Outlook For Silver

Silver and its outlook is the subject of an article in a recent issue of the Boston News Bureau, which has this to say on the matter: Silver metal sold last week as high as 65⅜ cents an ounce, as compared with 52⅝ cents, the low point for the year made last March. At current prices, silver is only a few cents below the year's high point of 68⅝ cents reported last January. Opinion in circles, in close touch with the situation, is that silver will advance further. This opinion is based on increased demand from the Far East, to industrial consumption in the United States, to a general improvement in economic conditions, and to operation of the Pittman Act.

The situation in the United States is interesting. With market price for silver around 65 cents an ounce, producers in the United States are selling their output to the director of the mint under the Pittman Act at the fixed price of $1 per ounce. So long as the market price for silver is below the $1 mark, the output of United States mines will go to the government until the requirements of the Pittman Act are completed and consequently the arts and industries are purchasers of foreign silver and the absorption of stocks on hand together with increased shipments to China have forced up the price in recent weeks.

Prior to June, 1920, there was but one quotation on silver, as the price was above $1 per ounce. With trade unsettlement in the Far East and a poor monsoon in India, demand from that quarter fell off while some European countries continued to sell their silver currency in the bullion market. This forced the price below $1 an ounce, and in June, 1920, the government began purchasing silver at the fixed price of $1. Speculators not familiar with the provisions of the Pittman Act shipped silver here which they purchased below the $1 mark, expecting to sell it to the United States government and make an easy profit. Tenders of silver to the government have to be accompanied by affidavits, however, declaring silver to be product of United States mines and smelting plants and the foreign silver consequently was not available for sale to the Treasury.

Since the Pittman purchase clause became effective in June, 1920, the trade movement in silver in the United States has shown a net excess of imports over exports, up to the end of August, 1921, of $12,553,109. Of this total there was an excess of imports in the last seven months of 1920 of $2,632,406, and for the first eight months of 1921 of $9,920,703.

The excess of imports over exports, however, has been below the recent consumption of silver by the arts and manufacturers in the United States in recent years. For 1919, amount of new material consumed by the industries was 26,237,519 ounces, which at the average price prevailing that year had a total value of $29,386,021. Figures for 1920 are not yet available, but they will probably be around the figures for the preceding year.

In addition to the demand from the arts there has been an increase in shipments to China in recent months, as shown in following table:

	July	June	May	April
China. . . .	$1,971,317	$147,825	$291,622	$ 63,376
Hong Kong.	1,376,849	480,130	816,475	424,253

Exports to the Far East the first seven months of this year are considerably below the two preceding years as shown below:

	1921	1920	1919
China	$4,825,983	$49,915,419	$14,057,899
Hong Kong . .	6,511,677	18,698,886	3,400,707
British India . .	1,846,593	223,211	108,273,177

An improvement in industry in China and India will stimulate a demand for silver from that quarter, and this, with the demand for industrial purposes in the United States and other countries, coupled with the fact that the output of the mines in the United States is not a factor, with silver selling below $1 an ounce, is expected to bring about a further advance in the price of the white metal.

PORT ARTHUR NOTES.

By J. J. O'CONNOR.

There has recently been considerable activity displayed in the territory lying south of Ignace, on the Canadian Pacific Railway, by iron ore explorers and Mining Engineers. It is stated that one of these parties, headed by one of the most prominent mining engineers, of Duluth, Minn. was highly pleased with the showings in quality and tonnage, on a property he had under examination in that area. No definite particulars have been given out regarding this deposit, which is said to be of magnetite. A deposit of limonite has been examined by another prominent mining engineer, within the past few days in the same field. No particulars of this deposit are obtainable.

P. E. Hopkins, Geologist of the Department of Mines, Toronto, has paid visits within the past few days, to Silver Islet, Silver Mountain, and to the scene of drilling operation in Paipoonge township, where boring for gas is being carried on by the Nepigon Exploration Company.

Dr. W. L. Tanton, of the Geological Survey, Ottawa, is engaged in mapping the territory between Dog Lake, and Lake Nepigon. This area is practically within sight of Port Arthur, yet very little is known regarding its possibilities either in the way of mineral, or agricultural opportunities. It is fully expected that interesting geological features will be met with in this area.

Julian G. Cross, M.E. is at present engaged in the Schreiber field, examining and reporting on various properties. Continued activity is being shown at the different properties now under development in this area, that give great promise of successful issue.

Shipments of silver to the Far East have been much lower this year than last, but there has been a very notable increase recently.

Rock Strata Gases in Mines

By G. E. McELROY, Mining Engineer, U. S. Bureau of Mines.

The development of certain mines in the East Tintic mining district, Utah, has been hindered considerably by the presence in the rock strata of heavy irrespirable gases which at times flood the lowest working places, as well as by abnormally high rock temperatures in the lower horizons. A study of these features was completed in the spring of this year, and the information obtained is summarized here.

Only four mines have been affected to date by the presence of heavy gas, and only one of these is producing lead-silver ores in quantity. These four embrace a territory extending about three miles north and south and about two miles east and west, while both within and fringing on this territory are a number of prospects which have not been affected.

Thus far no fatalities have resulted from gas inflows, but a number of men have been temporarily overcome, and a few have had narrow escape from death by suffocation. That the record is not more serious is mainly due to the fact that the gas inflow, as a rule is relatively slow, mining operations have been quite carefully conducted, and the presence and extent of a gas inflow can be easily determined by its extinguishing action on the flame of miners' lights.

The affected mines are on or near the crest of a large anticline composed of sedimentaary rocks, almost entirely overlain by lava flows. The sedimentary rocks consist of a great thickness of quartzite separated from overlying limestones of considerable but varying thicknesses by a formation of pyritic shales, 300 to 500 feet thick, containing interbedded limestones.

The Showing on Analysis.

Samples of the heavy gases all showed, on analysis, some oxygen content, attributed to diffusion with mine air. Calculation of the analyses of samples having a low oxygen content to an air-free basis shows that the pure gas is primarily a mixture of carbon dioxide and nitrogen with the carbon dioxide in excess. The gas also contains some sulphur dioxide, sufficient to cause marked irritation of the eyes and nasal passages, and to give it a strong sulphur odor. Air-free calculations for the samples analyzed show that, for the pure gas, the carbon dioxide ranged from 60.7 to 76.7 per cent and the nitrogen from 39.3 to 23.3 per cent, the composition varying as to locality rather than time or other condition. The pure gas is saturated with water vapor, and the temperatures noted, 84 to 110 degrees, corresponded roughly to rock temperatures of the localities where observations were made.

Comparison of the calculated weights of saturated gases with weights of partly saturated air for the range of temperatures, relative humidities and barometric pressures existing in the mine openings, shows that the gas is 1.25 to 1.40 times as heavy as the adjacent air. The difference in weight causes the gas to drop to the floor of openings, where it drains like so much water to the lowest points, and forms accumulations or pools. Diffusion of the gas with the mine air is relatively slow in quiet atmospheres, but increases as the air motion is increased, so that at velocities of several hundred feet per minute and over, diffusion is practically instantaneous during an ordinary inflow.

Oxidation of Sulphides.

The evidence gathered from the mines affected indicates that the heavy gases have resulted from oxidation of sulphides, and confirms the explanation offered by Lindgren and Loughlin in their geological report on the East Tintic district, published as U.S. Geological Survey Professional Paper 107. Oxidation was, and is, extremely rapid, due probably to extreme fineness of the individual grains of sulphide, both in the shale and in the ore bodies. The steps in the formation of the heavy gas were probably as follows: The chemical reactions of oxidation, by removing the oxygen in the available air, produced a residual atmosphere composed of practically pure nitrogen, and generated heat, sulphur dioxide and sulphuric acid. When the acids came in contact with limestone or other carbonates, carbon dioxide was generated, which diffused with the nitrogen and sulphur dioxide. This resulted in the formation of a heavy gas which, on account of its weight, settled down through the porous and shattered quartzite, and now rests presumably on water at an unknown depth. The sulphur dioxide would be continually oxidising and reacting, so that it would ultimately disappear from the gas, leaving carbon dioxide and nitrogen.

The Explanation Deduced.

The following theory has been deduced to explain the mode of occurrence of gas inflows: A decrease in barometric pressure causes an increase in volume, according to the laws of gases, of a large body of gas contained in the quartzite and resting on water at an unknown depth. As the gas body is confined on the sides and bottom, the increase in volume tends to raise the level of the gas. However, since field observations show heavy inflows only from shattered and fissured zones, it is concluded that the rate of penetration of gas into the porous quartzite is so much slower than the rate of increase in volume that the excess is pushed up through the shattered, more or less open, zones that occur in the quartzite. Under certain conditions of rate and amount of decrease of barometric pressure, the gas rises to the levels of mine openings and an inflow of gas results. The upward travel of the gas is limited by the practically impervious shale overlying the quartzite, except where local fissures in the shale provide access to connected fissure zones in the overlying limestones. As the barometric pressure rises, the increase in pressure causes a contraction of the gas body and the level of the gas in the shattered zones recedes.

HOLLINGER INSTALLING ROLLS.

The "Northern Miner" says that Hollinger is installing rolls at the shaft to follow the primary crushing. This will reduce the size of material going to the stamps and enable them to crush a larger tonnage.

Marketing of Alberta Coal

Embodied in the report of the Mines Branch of Alberta, which has recently been issued, are very interesting reports from Mr. Stutchbury, Trade Commissioner, and Mr. L. M. Hyde, Engineer, on their efforts to find markets for Alberta coal.

Mr. Stutchbury says in part:

On my appointment to the position of Trade Commissioner for the Province of Alberta on May 15, 1920, I was instructed to make a study and survey of the possibilities for extending the market of Alberta coal, more particularly in the Province of Manitoba. I immediately proceeded to Winnipeg, and discussed the matter with the Fuel Dealers, Board of Trade, Citizens' League, City and Government officials, and others, for the purpose of ascertaining why so large a tonnage of American coal was purchased by the consumers of coal in Winnipeg and Manitoba.

I found in many quarters a very strong prejudice against western coal among both domestic and steam users. This prejudice was very largely caused through an entire lack of knowledge of the various qualities of coal obtainable in Alberta, and more particularly through lack of proper knowledge of combustion.

Quite a number of people whom I met were of the opinion that all Alberta coal was very low grade lignite, not capable of generating steam, and exceedingly dangerous for household use.

Many people who had used our coal during 1918 when under Federal Fuel Regulations (which made it compulsory to purchase one ton of western coal with each ton of American coal) and not having knowledge of the proper methods of combustion, found Alberta coal unsatisfactory, and reverted to American coal in 1919, when it was again made available.

It was, therefore, deemed advisable to enter into a carefully planned and vigorous campaign of advertising, drawing the attention of the people of Manitoba and Saskatchewan to the enormous coal resources of Alberta, and also to their high combustion qualities. In addition, the consumer was urged to purchase coal during the summer, so as to relieve congestion on the railways during the grain hauling season.

The Citizen's League, Fuel Dealers, and other public bodies in Winnipeg gave their very heartiest support to this campaign, which has resulted in not only breaking down prejudice which was heretofore existing, but also increasing the tonnage into that market very materially.

It is interesting just here to compare the figures of 1917, 1918, 1919 and 1920, of shipments into Manitoba from this field.

In 1917 the tonnage (railway coal not included)	249,872
In 1918 the tonnage (railway coal not included)	511,168

(During 1918 the Federal Government Fuel Controller ordered that the people of Manitoba must purchase one ton of western coal for every ton of American coal they desired).

1919 . . . . . 314,290 tons

(The compulsory order was off during this year and no educational campaign had been carried on).

1920 . . . . . 600,962 tons

(This was not on a forced market but is the result of educational campaign and shows a satisfactory increase).

It quite early developed while in Winnipeg that there was not a complete understanding between the fuel dealers and the coal operators of this Province, and a convention of the dealers of the three western provinces was called to meet with the operators for a full and frank discussion of the coal trade and its possibilities for development. The convention was held in the City of Calgary on August 19 and 20, and was most successful, a very representative gathering of both dealers and operators. The discussion was very free, frank, and entirely harmonious, and I believe the meeting resulted in the establishment of a much more complete understanding between the fuel-dealers and the operators.

Both dealers and operators expressed their appreciation of the Government for what it was trying to do, and this expression was moved by Mr. L. E. Drummond, of Edmonton, in the following resolution:

"This Convention of coal-dealers of the three western provinces, meeting with the Alberta operators, wish to place on record its appreciation of the Alberta Government and the Hon. J. L. Cote, Minister in charge of the Mines Branch, for the calling of this convention and for their efforts in extending the market for Alberta coal also for the research programme which is now being conducted on western coal."

Mr. Whiteside, President of the Western Coal Operators' Association, in seconding the resolution, stated that while the operations of the Government were comparatively recent, the results so far obtained had been beyond their expectations, and agreed with Mr. King of Winnipeg (a previous speaker) that actual demonstration, coupled with newspaper advertising, would do a great deal to overcome the prejudice in the minds of Manitoba consumers.

Mr. M. L. Hyde was appointed as Resident Combustion Engineer, in Winnipeg, during the month of August, and his services were placed by the Government at the disposal of both the Fuel-dealers' Association and the consuming public. Mr. Hyde, since that time, has been very active in attending to various calls that have been made on him, and has visited and worked with a very large number of the Plant Engineers, and established a personal contact between the Engineers and the Government such as would not have been possible in any other circumstance.

About October 1 a Fuel Demonstration Plant was opened at 277 Smith Street, right in the heart of the business district. Public demonstrations are held daily, demonstrating proper methods of firing Alberta coal. These demonstrations have been popular and largely attended, and very much good has resulted.

For the further direct education of the consumer, there have been published and distributed a bulletin on combustion and three illustrated cards for domestic coal-users and janitors, giving simple and explicit instructions as to the proper methods of burning Alberta coals. Enquiries for this literature have been received from all parts of Canada, and even from the Border States.

During the month of September, exhaustive tests were made in the Central Heating Plant of the Manitoba Government. These tests were in competition with

Youghigheny coal from Pennsylvania. The results were very highly satisfactory for Alberta coal.

After the tests were completed, a meeting of the Chief Operating Engineers of Winnipeg was called. This meeting was held in the Fort Garry Hotel, and 103 Engineers were present. Addresses were given by the visiting Engineers from Alberta, and a round table conference ensued. The interest was such that the meeting lasted until almost midnight, and gave the Government, through the Trade Commissioner, a very fine opportunity of personally discussing the various problems with the men who are directly responsible for the purchase of coal.

Many enquiries have been received this year from Ontario and Quebec relative to the shipping of Alberta coal to far east points, but so far the freight rates have been prohibitive for this field. It is interesting to note, however, that there have been shipped into Ontario almost 14,000 tons since June. There is no doubt that a very large market east of Great Lakes would be developed for our higher grade coals if a reasonable freight rate could be secured.

The policy of this Department has been to develop, as far as possible, geographic markets, and to that end a study was made of the possibilities for shipping coal into British Columbia.

In a recent trip to Prince Rupert it was found that a very large tonnage could be developed along the line between Edson and Prince Rupert and the coast plants, both mining and fishing, off the coast from Prince Rupert.

A conference was held with Mr. A. E. Warren, General Manager of the Canadian National Railways, with a view to having bunkering facilities placed at Prince Rupert, and a promise from him was received that such would be done.

The matter of special freight rates for coast points is now under advisement.

The development of the industry this year has more than proven the importance of an educational and publicity campaign as the following figures will show:

The production of coal for 1919 was 5,022,412 tons and for 1920, 6,908,923 tons; which is an increase over 1919 of 1,886,511 tons.

Mr. M. L. Hyde says in part:

Appreciating the opening offered Canadian coals due to the American fuel shortage and prevailing high prices, the Province of Alberta started a preliminary advertising campaign as early as 1917. Results were so gratifying that in the spring of 1920 educational as well as advertising work was undertaken. In August of that year, the writer was appointed to act as Combustion Engineer, with headquarters at Winnipeg. His instructions were to work through and in harmony with the Winnipeg Retail Coal Dealers' Association, and to educate both the domestic and steam coal-buyer in the use of Alberta coals.

Up to as recent a date as 1917, Manitoba had used practically no domestic fuel other than Anthracite, Coke, and a very inconsiderable amount of Souris coal.

In order that the difficulties encountered in winning this market for our domestic coals may be better appreciated, it will be of interest to know just what this competition represented.

American Anthracite, or hard coal, as sold in Winnipeg, averages 12 per cent. ash. It burns slowly, in a glowing mass of great heat and without flame or smoke. While hard to ignite, it holds fire over long periods, is dustless, and has practically no breakage in handling. It will hold fire for a given length of time in a similar fire-pot than can be used for any other type of fuel, and the majority of the earlier types of house-heaters were designed and rated for its use.

The coke sold in Winnipeg comes from gas retorts operated by the Winnipeg Electric Railway Company, and is made from American Youhikheny Gas Coal. It carries about 10 per cent. ash, and has very much the same burning characteristics as Anthracite, except that a larger fire pot is required, owing to its bulkiness. About 60,000 tons are imported each year for coking.

Souris is a low grade lignite, mined in southern Saskatchewan. It is sold on a price basis only, and offers no serious competition.

Hand-firing Alberta coal calls for an entirely different process from that used with anthracite or coke. In order to educate the public in the shortest possible period of time, a demonstration room was opened in October, in the heart of the shopping district. Five representative types of heaters were installed, with a practical demonstrator on the floor to fire them. Bins, with samples of all representatives domestic coals, and signs, giving their relative values, were also put in. A strong advertising campaign is used to keep up public interest, and excellent results were obtained. Each visitor is given a practical lesson in firing his particular type of furnace, also a card of instructions to be hung in his basement.

Winnipeg dealers are unanimous in their praise of the work accomplished by this demonstration. If maintained, there is small doubt but that our domestic coals will hold a good portion of the Winnipeg market permanently.

Western Domestic Coal Operators are to be congratulated on the hearty co-operation they have rendered the Province by their exercise of care in shipping only their best prepared products into this market.

Prior to the spring of 1920, Winnipeg had not used our steam coals to any extent. Most heating and power plants were designed for American smokeless coals, either anthracite or Pocahontas, though a great deal of Youghigheny, New River, and Miller's Creek was in demand.

It is even more essential that the difficulties encountered in the steam market be appreciated. Here we deal with experts familiar with coal values, who must be satisfied as to grading, heat units, and ash content of all coals they contract for—the same as the railroads. In giving Manitoba part of their output, the mines had to ship exactly the same grades the railroads were taking—they could not possibly change their equipment to make a special commercial coal—nor did they have the labor to do so, had the equipment been available.

In criticising Western coals, it must be remembered the operators, in most cases, gave Winnipeg the best they could; but their best, during these abnormal times, was in no way representative of what they could offer under normal conditions, and the consumer made his comparisons on pre-war American as against Western coals mined under severe difficulties.

The writer feels that there is a strong brief to be held for the Western operator; he did his level best, except in a few instances where some salesmen took gross advantage of Winnipeg dealers.

In Winnipeg are established branches for several

large American coal operations. These are owned by American capital, and Alberta can expect no co-operation from them. One company, the largest in Winnipeg, and owned by Americans, stocked heavily coals from the Yellowhead district and sold them as representative bituminous of the highest grade, under the trade name of Western Star. They showed on analysis, 19.71 per cent. ash and represent a poor sub-bituminous, entirely unsuited for the Winnipeg steam market. The public, when they complained, were advised this coal was a typical sample, and asked to bear with it until American coals returned. The writer, immediately he discovered the means this concern was taking to damage Western coals, took every step to enlighten the public direct, and most of the damage intended was averted.

Such practices have been used greatly to the detriment of our good name, and they must be stopped at all costs.

Competitive Coals.

Before going further, competitive coals and their preparation should be understood. The Manitoba market has always proven a good outlet for American coals when the home market was slack. By means of docks at the head of the Lakes a haven was offered to mines which would otherwise have had to shut down. The large operators therefore equipped their own docks at Duluth, Superior, Toledo, and such points with the most modern coal handling machinery known; stocked only their finest low ash coals, and sold them in Manitoba through their own organizations. They backed their coal with guarantees and the highest technical services.

Youghigheny.—The Pittsburg Coal Company offers Winnipeg two different grades of this coal. The straight gas from the thin veins near Pittsburg (this runs under 1 per cent sulphur and is used by the Winnipeg Electric Railway in its gas house retorts) and steam coal from its mines in the Panhandle district. The latter is too high in sulphur for gas making, and is sold only for steam purposes. All these coals are shipped from the mines over a ¾-inch screen. While very hard, and able to resist severe treatment, from 35 to 40 percent. breakage occurs by the time they are in storage at the dock. Here the coal is all resecreened over either ¾-inch or 1¼-inch screens, to suit purchaser.

Pocahontas.—This is a semi-bituminous coal, known to the trade as smokeless, and comes from West Virginia. Pocahontas is shipped from the mine as Run of Mine, but, owing to its friable nature, contains at least, 75 per cent. screenings by the time it reaches storage at the dock.

Large quantities of New River Coal from the White Oak Coal Company also reach the Manitoba market.

Other American coals are Miller's Creek, or No. 8, and Elkhorn.

As soon as navigation opens in the spring, all the above will be put on the docks in large tonnages—there is no question about this. We also know that the approximate cost F.O.B. Winnipeg will be as follows:

Youghigheny, F.O.B. mine, minimum	$ 3.00
Freight, mine to Lake Erie	1.91
Freight, across Lakes to Canadian docks	.60
	5.51
American exchange, 20 per cent	1.38
Cost in Canadian currency	6.89
Duty	.53
Handling at dock	.75
Freight, dock to Winnipeg	3.30
Cost to Winnipeg dealer	$11.47

Note.—Pocahontas may be estimated at $2.50 more than Youghigheny owing to additional freight charges, and increased price F.O.B. Mine.

These prices cover Run of Mine. The duty on slack is 14 cents in place of 53 as given above.

With this information, and the expectation of a system of grading, our course for next year's campaign is fairly clear. Out of the $11.47 total cost, $7.87 covers transportation, against $5.30 for Western Steam coal—a differential in their favor of $2.57. While American operators are insistent that legislation be enacted introducing the seasonal freight rate plan, as an incentive to summer storage, if this were done we should surely expect proportional rates here.

Our mine price will have to be on a B.T.U. basis of commercial coal graded to compete with Youghigheny. Run of Mine coal must carry all the clean lump that comes from the mine, must be free of cap rock, not over 15 per cent. ash, and of a coarseness that 40 per cent. will pass over a ½-inch screen.

By loading coal only from sections of the mine known to be of standard quality and hardness, and by careful picking on the surface, these requirements can be fully met.

Other points Western Operators should take into consideration:

(1) Overcoming prejudices now in existence, due to treatment of the public during past year.—This can be done only by proper guarantees as to quality, and grading F.O.B. Winnipeg. Removing ash from Winnipeg plants costs $2.50 per load of about two tons. This represents 12½ cents on every ton of coal purchased for each 10% variation in ash, not taking into account the additional labor in the boiler room, nor the $5.30 per ton freight, plus dealers' fixed charges. This is a serious factor, and the operators should appreciate it.

(2) Selling on consignment, or on a special summer price with the payments falling due in November and December.

(3) Selling on a scale of discounts according to tonnage.

At present the purchaser of one car gets exactly the same price as the man buying one hundred.

In his work towards winning next year's market the writer has received invitations to conduct tests at the steam plant of T. Eaton & Company, representative heating plants of the School Board, Oldfield Kirby and Gardner, and the General Hospital, and the Gas Plant of the Winnipeg Electric Railway Company. The combined tonnages of these purchasers is close to 100,000 and results obtained in their plants receive the broadest mention.

Special cards of instructions for burning steam coals under different types of boilers have been distributed to all plants, and weekly lectures given to different groups of firemen in the plants of the larger employers. Articles on Western coals are being furnished such magazines as reach buyers throughout the Prairie Provinces, and in every way at his command the writer is endeavoring to win as large a portion of the Manitoba market for Alberta coals as possible.

The work as planned for 1921 contemplates carrying

on the present educational campaign with steam coal purchasers and their employees; a close follow-up of all architects and building contractors, with the object of using every influence towards obtaining the installation of suitable furnaces for western coals in all new buildings and in all overhauling of present plants; a watch on all dealers during contract placing season, to the end that every influence may be exerted towards getting them to buy as heavily from Alberta as possible; a personal check on shipments of Western coals, including destination, analysis and quality of grading (this will enable the Province to protect the buyer in all cases where operators are not shipping suitable coals); competitive boiler trials against American coals.

In order that first-hand information might be available as to just what co-operation the Province could expect from the Steam Coal Operators, the writer made a personal visit to all the mines in the Crow's Nest Pass. Assurance was given by both the operating and sales department of all these mines, also Mountain Park and Cadomin, that they would use every means in their power towards carrying out the programme outlined.

The following figures are of interest in showing the tonnages used on the Manitoba market:

	1919	1920
Alberta Domestic	270,467	456,404
Alberta Steam	42,547	143,202
Alberta Anthracite	1,276	1,356
	314,290	600,962
American Anthracite	383,737	255,000x
American Steam	401,958	235,000x
American Smithing	11,406	10,000x
	797,101	500,000x
Totals	1,111,391	1,100,962

Note.—Figures marked "x" are rough estimates only. Figures on American shipment cover coals entering Canada via the docks at Fort William, Westfort, and Port Arthur; and do not include railroad coals.

SCIENTIFIC INDUSTRIAL RESEARCH.

The sixty-second meeting of the American Chemical Society was held in New York recently. In addition to the large number of members present, leading chemists from Great Britain, Canada and other countries took part in the international meeting at the College of the City of New York and the other meetings held in the gymnasium and lecture rooms of Columbia University.

Prof. R. F. Ruttan described the workings of the plan for the development of industrial research in Canada. In 1916 the government of Canada by order in council established an Honorary Advisory Council for Scientific and Industrial Research, corresponding very closely in organization to the National Research Council for the United States and modeled largely on the Advisory Council for Scientific and Industrial Research in Great Britain, which has now become the Department of Scientific Research of the British Government.

Recognizing after investigation that liaison between research and industry could not be effected except by organized effort, a Central Research Institute was established near Ottawa. It is to be housed in a four-story building, 200 x 60 ft., with power plant and laboratories, the first $100,000 being specially granted by the Cabinet to get the work under way during 1921.

The functions of the institute may be briefly described as follows:

(1) It will be the Bureau of Standards for Canada.

(2) It will carry on fundamental research in chemistry, physics, biology and related fields, investigations similar to those engaging the attention of university professors in scientific laboratories.

(3) Investigations in biochemistry and bacteriolgy, both general and as applied to such industries as the fisheries and packing industries.

(4) Investigations undertaken on recommendation of the Research Council from time to time to promote the utilization of the natural resources and valuable waste materials of the country.

The type of research work described under these four heads will be carried on by the permanent staff of the institute, associated with specialists engaged from time to time. This group of highly qualified investigators will form an advisory body for the industrial specialists who will be engaged by the Research Council or paid by the industries "to conduct investigation and standardization at the request of any group of industries in Canada concerning the materials used by them or of the products of such industries."

The difficult question of remuneration for valuable and patentable discoveries has been left largely to the discretion of the Research Council. The intention of the Council is to give a liberal share in the commercial rights of all such discoveries. Its function is to develop research, not to exploit it.

BETTER OUTLOOK AT COBALT.

Of conditions at Cobalt, the "Northern Miner" says:

It looks now as though this year's silver production of Cobalt, in ounces, will be little if any below last year's output. The first six months of the year were quite close, despite the drastic curtailment of operations of the late winter. Mining Corporation, O'Brien, LaRose and Coniagas are doing much better than a year ago in number of ounces. And the outlook for all the mines is immeasurably improved. Last autumn things were starting to look pretty blue. The price of silver was swooping downwards daily. The costs of producing it were swooping upwards. It was hard to get men, and hard to get them to work when they'd been hired. A year ago there was nothing to make an operator confident and easy in his mind. Today's price of silver isn't too bad, and there can be little doubt that the price will gradually work higher. Certainly no one can be found who will argue that there are potent reasons why the price shouldn't go up. And the costs of mining are steadily coming down, a little here and a little there, with old high-price stocks of supplies working out of the stores at the mines and new supplies coming in much cheaper. But without doubt the greatest improvement has been in the attitude of the miners toward their work, and the change in this attitude has been most pleasing to managers.

Institution of Mining Engineers in Britain

Three Important Papers on Coal Mining Read at the Annual General Meeting.

By Roland H. Briggs.

At the Annual Meeting of the Institution of Mining Engineers in Britain held on September 14th and 15th, three important papers were read, of which one of the most interesting was on "Coal-mining by steam shovel in Alberta" by Mr. George Sheppard.

The coal district described below occurs in the Brazeau Forest Reserve in the Foothills west of the Province of Alberta. The area is roughly 150 miles west of the city of Edmonton, and the Grand Trunk Pacific Railway connects up this city and the east to Vancouver.

In order to develop this comparatively new coalfield, the Alberta branch-line of the G.T.R. was constructed, which runs from Edson to Coalspur and terminates at the mining settlement of Lovett. The construction of this branch-line has been governed primarily by geological conditions, as it follows a north-westerly to south-easterly direction in conformity with the general strike of the coal-bearing formations. The Little Pembina River flows along the strike of the geological formations of this area, and, as a consequence, is found in close proximity to the railroad.

The major streams or rivers of this district, namely, the MacLeod, Brazeau, and Blackstone, are all probably following pre-glacial valleys and cut across the strike of the dominant beds, thereby exposing good geological sections.

Three Groups of Territories.

The chief features of topographical interest are directly connected with geological conditions, and for this reason the territory constituting this part of western Canada can be subdivided into three groups, namely, the Rockies, the Foothills, and the plains. The Rockies form the western background, and present an unbroken line of imposing peaks both to the north-west and south-east. Immediately abutting the mountains to the east are minor hills of considerable magnitude, which can be designated the Foothills proper. The Foothills present a series of parallel ridges, with intervening valleys, which give the country a roughly undulating aspect. Towards the east of the above belt, the hills decrease rapidly in altitude, until finally the topography flattens out to the monotonous and gently undulating character of the plains.

The greater part of the area under consideration has been covered with thick forests of spruce, pine, and poplar in the past, but a repetition of forest fires has destroyed the greater part of the older timber. New growth, however has quickly established itself, with the result that the whole terrain is now supporting a thick growth of new timber which will eventually develop into a considerable forest areas.

This western part of Canada, and indeed the whole of the same territory extending north and south along the same meridian, can be divided into three distinct geological and topographical areas, namely:—

(1) The Rockies . . . . . Palaeozoic.
(2) The Foothills . . . . . Cretaceous.
(3) The Plains or Prairies . . . . . Cretaceous.

For the most part the older Palaeozoic rocks of the earth's crust, the Carboniferous, Devonian, Silurian, and Cambrian, have been raised into a series of thrust-blocks which, in many cases, have actually overridden the newer Cretaceous formations of the plains to the east.

Over-Thrusting Compression.

The chief mountain, in Montana, at the Waterton Lakes Park, and at the Crow's Nest Pass of Southern Alberta, these older rocks of Palaeozoic age (usually consisting of hard metamorphosed argillites and limestones) are seen resting upon the newer Cretaceous sediments—a curious reversal of the law of superstition. It is by this process of over-thrusting and teutonic compression that the Cretaceous formations have been step-faulted and folded into a serious of structural ridges and alternating depressions. Incidentally, it may be noted that the topography of this area directly expresses the underlying geological structure. Towards the east of the foothills however, the undulations become less defined, until finally the formations gradually flatten out to approximate horizontally in the plains.

The general direction of the main range of the Rockies in this part of Alberta is to the north-west, and, as a consequence, the Foothill belt, with its associated features of structural interest, presents the same disposition.

Description of Geological Formations.

This comparatively small Foothill area which is now being developed for coal near Coalspur extends to the south-east roughly parallel to the Rocky Mountain range. A series of low longitudinal hills and corresponding valleys occur, which are interpreted structurally as anticlines and synclines. Since the original forces operated which caused these undulations in the Cretaceous formations, both glaciation and secondary processes of erosion have modified the topography to an appreciable extent, and, in this way, the crests of the principal anticlinal structures have been eroded and the synclinal valleys deepened.

The most easterly fold of any importance can be termed the Coalspur-Lovett Anticline. To the west of this a corresponding syncline, with minor anticlinal folds and faults, occurs in which the workable seams of coal are available. The most important coal deposits commercially occur on the crest of the structural uplifts.

In the majority of these cases the coal operations have little overburden to contend with, owing to the fact that a considerable amount of superficial erosion had taken place prior to the general glaciation. In short, the mining operations resolve themselves into a system of stripping and subsequent removal of the coal by means of the steam-shovel.

To the east of the main fold the geological formations flatten out appreciably, and thus the known coal-seams disappear to a considerable depth below the surface of the ground.

In the Coalspur coalfield the workable seams are found in the Belly River formations only, as this strip of territory happens to be folded suitably for the development of the coal-deposits on the surface.

Ten Coal Companies Working.

In conformity with the general rule of the Western Provinces of Canada, the first coal was discovered through the efforts of prospectors, who were attracted to the field some twelve years ago.

The original samples were analysed at the provincial laboratory, and proved to be of a high grade. Operating companies then became interested in the field, and large areas were staked for the purpose of subsequant exploitation. At the moment about ten coal companies are working in this district, and the majority are producing a good domestic or a fair grade of steam-coal. The deposits throughout are remarkably uniform in quality, and certain seams produce a good coking material yielding about 75 per cent of coke.

The greater part of the coal in this district is steam-shovelled—that is, it is actually obtained from the surface outcrops much in the same way as railway-ballast or gravel.

As a general rule the overburden is almost negligible, as it consists of soft glacial clays or gravels, or more rarely of a few feet of friable weathered sandstone. In certain cases the coal is in perfect condition for the application of the steam-shovel, as small fault dislocations have slickensided and fractured the coal to such an extent that it can be easily recovered. In few instances only is blasting resorted to, and this usually to remove a high face which is out of reach of the operating tool.

The Oliphant-Manson Mine is one of the most remarkable coal-mines in the world. The main excavations have been along the outcrop and, despite continued operations in this area for a considerable time, there are still many millions of tons of good-grade coal in sight.

The forces of nature have been particularly well disposed in this mine, as the coal occurs on the surface. Two complementary seams (originally forming the flanks of a small anticlinal fold) have been faulted together at the apex, thus producing a workable deposit 182 feet in thickness. Two steam-shovels are continually at work, and it is possible to load over 1,000 tons of coal in the trucks every 24 hours.

In order to remove the coal recovered by the shovel, two small trains, each drawing eight or ten trucks, are employed, and these quickly transport the coal to the electrically-driven screen. Here the material is separated by means of the inclined screen into its various sizes, and all the slack or small coal is loaded separately for use in smelting operations. A box-car loader is used for the purpose of expediting the despatch of the coal-train. This automatically loads and packs the coal into the box-cars used on the railways, and so obviates the employment of a gang of men for this purpose.

The workings extend fully a quarter of a mile into the coal, and on either side, cliffs of solid black coal occur up to 30 feet in height.

Character of Operations.

A close examination of the coal-face reveals the fact that the material is slickensided, faulted and folded to a minor extent, especially near the fault contact of the opposing seams of coal. This, however, is by no means detrimental to the quality of the coal. On the other hand, the slight discolations are an advantage to the operator, as the coal is in a more accessible condition for the steam shovel.

In local areas the coal contains a small amount of "bone," which consists for the most part of calcareous material interveined with iron Pyrites.

Lenses of coarse sandstone (containing plant-remains) are common in certain zones, as well as concretionary masses of argillaceous sand.

At the Blackstone No. 1 Mine the coal occurs at the crest of a comparatively flat anticline. There is no solid overburden, the only material on the surface of the outcrop being loose gravel and earth of glacial origin. After stripping in the usual way, the coal is immediately loaded into the trucks.

At the Blackstone No. 6 Mine, a sandstone layer about 10 feet in thickness forms the overburden. To the east of the exposure a deep tributary to the Little Pembina River has excavated a valley, thereby exposing the coal-seam. Operations were started from this point, and so the face was worked to its present dimensions. Towards the west of the exposure lenses of sandstone interfinger the coal, but apart from this the deposits form no difficulty for the steam-shovel.

The Foothills Colliery is operated by the usual methods. The coalseam dips to the west at a low angle, and the face is thereby exposed along the railway cutting. A shaft follows the seam, and the coal is removed by horse traction to the trucks in the railway-sliding.

Absorption of Gases in Coal.

Mr. J. Ivon Graham, M.A., M.Sc., presented an important scientific paper on the adsorption or solution of methane and other gases in coal, charcoal and similar materials.

Although coal is a solid it is capable, like charcoal, of taking up or "dissolving" quantities of gases, and in general the more easily liquefiable the gas the more readily will it be dissolved by the coal. In the case of those gases absorbed to a lesser extent, such as hydrogen, oxygen, and nitrogen, the curves expressing the relation between gas-pressure and amount "dissolved" are practically straight lines—the absorption in these cases thus obeying Henry's law for the aqueous solution of gases. In the case of the more soluble gases there is, however, considerable deviation from the linear equation.

This phenomenon of the absorption of gases by solids, or the withdrawal in a selective manner of dissolved substances from their solution, in the absence of, or apart from, any chemical action between the material and the gas, or dissolved substance as the case may be, is generally termed "adsorption" or "solid solution". Either of these are useful terms to cover a physical change which is not yet thoroughly understood, but which is now generally explained as one in which the molecules of the substance adsorbed are attracted to the surface, and particularly the internal surface, of the adsorbing material (charcoal, coal, or whatever this material may be) and there momentarily retained through the exercise of inter-molecular forces. The process is reversible and depends upon the concentration of the surrounding media of the gas or substance capable of being adsorbed.

Mr. Ivon Graham's Experiments.

Mr. Graham has carried out a large number of experiments under both normal pressure conditions on this property of adsorption, and from the results obtained has concluded that from solid coal, where the reduction of external surface area is 100 per cent, for practical purposes the adsorption of gas may be taken to be about 65 to 70 per cent of the adsorption which is found with fine dust.

A point to consider, which is of great practical interest, is what will happen when through earth-movements a portion of the seam is ground to the form of a fine dust. If a gas pressure of 30 atmosphere is assumed throughout the mass of coal in the seam, a reasonable assumption for a gassy seam newly opened, in the light of the late Sir Lindsay Wood's classical experiments, the accumulation of fine dust previously saturated in the solid and compact condition is now capable of picking up considerably more gas in order that it may be saturated at the same pressure. This will without doubt take place, gas flowing from the solid until an equilibrium pressure is obtained. With coal such as Barnsley Soft, containing its natural moisture, it may be shown that 1 ton of fine dust will contain as much as 470 cubic feet or 17 times its volume of methane. This is obviously not as much as would be contained in a cavity at this pressure. At pressures below 5 atmospheres, however, owing to the shape of the adsorption curve an amount may be taken up by the coal greater than would be possible to compress into a cavity at the same pressure.

There will thus be an enormous reservoir of gas available for discharge in the event of the pressure being suddenly released. This might take place, for example, by coal intermediate between the position of the dust accumulation and the working-face being taken off until what was left was insufficient to withstand the high pressure behind it, and was consequently blown out.

In connection with the adsorption of methane, a point of practical interest to mining engineers is the thermal charge accompanying this phenomenon. During the adsorption of this gas a certain amount of heat is evolved, and conversely when the adsorbed gas is liberated a similar amount of heat is evolved, and conversely when the adsorbed gas is liberated a similar amount of heat will be absorbed. This cooling effect is especially noticeable at a gassy longwall working-face where a considerable amount of firedamp is draining away through breaks and fissures from behind the coal-face.

From preliminary measurements of this heat of adsorption of methane by coal-dust, a figure of 0.1 calorie per cubic centimetre has been obtained, or 28 large calories per cubic foot of gas adsorbed. If there is in the coal-seam a pressure of 10 atmospheres, and during mining the pressure of gas drops to 1 atmosphere, the quantity of gas given off, according to the figures for Barnsley Soft coal moist, should be 138 cubic feet per ton of coal. The cooling effect of this would be such as to produce a lowering of temperature in this mass of coal of 3.0 deg. Fahr. It is thus readily intelligible how coal at a longwall-face may be lowered well below the natural rock-temperature when it is being worked at a rate sufficient to counter-balance the heat-flow from the higher temperature of the surrounding strata. Owing to the comparatively low conductivity of coal, shale, etc. it is not surprising to find a difference of 2 deg. to 3 deg. Fahr. between the temperature taken 12 to 15 feet in front of a longwall-face and the natural rock-temperature at the same depth at other points in close proximity to this working-face.

Major Roscoe's Paper.

Major H. Roscoe, O.B.E. presented a paper on the need for standardisation in geological sections of strata proved in the boreholes, shafts and similar mining operations. It is important that fossil records should be included. The ideal mining section should accurately and boldly record all information likely to be of the smallest use to geologists, mining engineers, borers or sinkers in the future.

In the heading of the section the title, latitude and longitude, surface level in relation to ordnance datum, and if a shaft or cross drift, the true bearing of the line of the section should be given. The conventional colours and signs should be simple, and the scale should be drawn in a prominent position.

In column (I) height above general datum in the section is given; in col. (II) the dates showing the progress of boring or sinking; in col. (III) the lithological description and sample numbers; in col. (IV) the true thickness of the stratum; in col. (V) the lithological section; in col. (VI) the subdivision of the geological formation; in col. (VII) the scale; in col. (VIII) the Palaeontological section; in col. (IX) the palaeontological detail; in col. (X) the boring or sinking remarks, the rate and direction of the dip of the measures, and the deviation of the boring from the vertical. Mr. Roscoe gave details with regard to the manner in which each of these columns in the proposed standard section chart should be filled in.

GOLD MINES A BRIGHT SPOT.

In the "Northern Miner", Mr. Homer L. Gibson says:

"About the brightest spot on the industrial map just now is gold mining. The world's real need of an increased supply of the yellow metal to bolster up the flood of paper money which was issued during and after the war, is the underlying cause for the demand which exists for the metal. This demand, coupled with the fact that gold is just about the most easily marketed commodity one can thing of today, makes the industry appeal very strongly indeed to some of the shrewdest of the world's financiers.

"Where, because of "buyers' strikes" etc., the manufacturer of many other articles are beset with difficulty in marketing their output, the manufacturers of gold—that is exactly what gold miners are—are faced with a condition exactly opposite. In other words, their energies can be devoted entirely to production, in the certain knowledge that buyers will literally come to their very door to carry their product away.

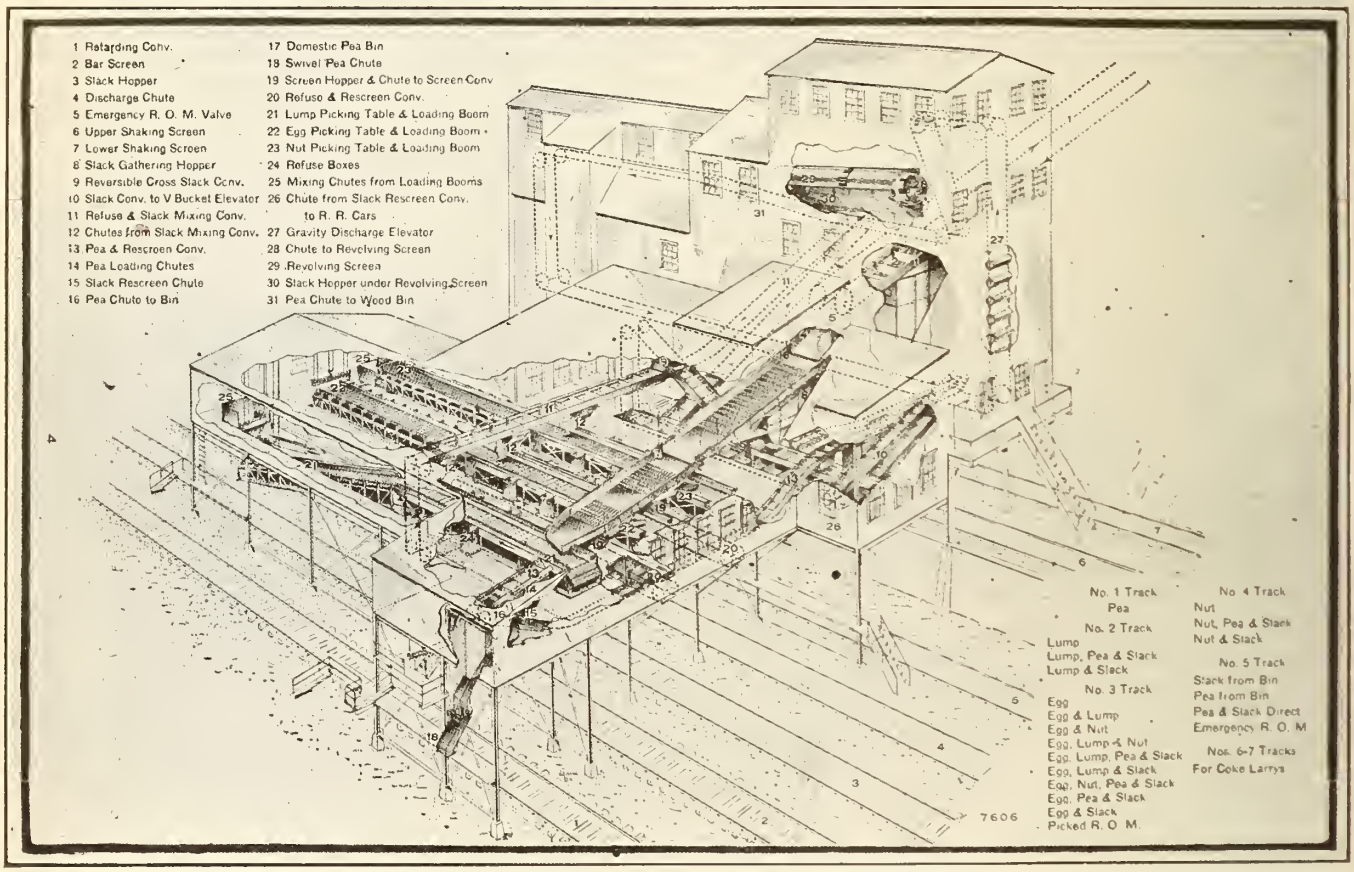
"What a change in one short year! A twelve-months ago, gold was just about the cheapest thing on the market. That is, its purchasing power, by reason of the high prices which prevailed for other commodities, was lower than at any previous time in history. In the face of rising commodity prices, the very stability of its prices was a severe handicap to its producers. Expressed in terms of materials, an ounce of gold would buy little indeed, and as for purchasing labor, it seemed that none was available at any price.

"Now however, the producers of gold can purchase, in terms of labor or commodities, a much greater supply for every ounce of output. Labor, a year ago, scarce, indifferent, and inefficient, is now clamoring for employment. The salesman for machinery, steel, chemicals and other materials used in mining, is anxious indeed for orders, and will grant the last concession possible to secure the business. In brief, the gold miner has come into his own again, and for a period of years at least will be able to compensate himself for the lean war period.

TIPPLE AND EQUIPMENT IN USE BY THE POWHATAN COAL COMPANY.

In an article in the Journal, last week, on Coal Mine Equipment in West Virginia and Kentucky, it was stated, with reference to mine car dumps, that the dump most in favor, and probably the fastest of all, is the power-operated, single compartment, rotary dump of the standard type, with some accessories, which dumps one, or, at the most, two or three, cars in tandem without the necessity of uncoupling the trip. Swivel couplings are used on the cars, and the centre of the dump is made coincident with the couplings of the car. Successful operation depends on securing the proper grade of the track entering and leaving the dump, and the proper control of the trip by means of a series of automatic car stops, which take the impact of the oncoming loaded trip and the pull of the empty cars, allowing the dumping car plenty of freedom in action, and, at the same time, imparting sufficient momentum to the empty car, to move it away quickly. These dumps have actually attained a speed of seven cars a minute in continuous operation.

A very good example of many of these new tipples is that of the Powhatan Coal and Coke Co., at Powhatan, W.Va. This company has been operating since 1889 on the No. 3 Pocahontas Seam in the heart of the famous Pocahontas coal region. The coal seam outcrops at an elevation of about 325 feet above the lines of the Norfolk and Western Railway. The mining is by the double entry panel system with two main drift openings and the mine is electrically equipped. The accompanying perspective drawing gives a very clear idea of the equipment for this tipple, which has a capacity of 450 tons per hour. As can be seen from the drawing, the tipple is divided into two parts; the low building over the tracks is for the screens and picking tables, while the high one to one side contains the pea, the slack and the refuse bins.



Tipple Of The Powhatan Coal and Coke Co.

Courtesy of the Link-Belt Co.

WELSH COAL TROUBLES.

On Monday last a situation which may portend serious trouble arose in the South Wales coal field owing to a misinterpretation of the settlement of the last coal strike, the Mines Department requiring the owners to contribute a further ten shillings per ton, amounting to £750,000, towards wages. The owners expected this sum to be provided from the Government subsidy of £10,000,000, of which £3,000,000 remain. After a hurried meeting at Cardiff the coal exchange owners decided to close a large number of the collieries. If this decision is carried out the unemployment situation in South Wales will be seriously aggravated. It is devoutly to be hoped that, by the time these lines are in print, this dark cloud which, at the moment of writing, appears to threaten the coal industry in Wales—an industry which looms so large in the industrial life of that small county—may be dispersed.

Mr. Joseph Errington, of San Francisco, is in Toronto for the annual meeting of McIntyre-Porcupine and Blue Diamond mining companies.

Mr. H. P. De Pencier, general manager of Dome Mines Ltd., is in Toronto this week.

Northern Ontario Letter

THE SILVER MINES.

The Cobalt Field.

This week's quotations for commercial bar silver give rise to high hopes of a great broadening out in the scope of work in and around the silver mines of Cobalt.

Local mines are now receiving approximately 75 cents per ounce for the metal they produce. Not only has this swelled the margin of net profit at the producing mines, but it offers every inducement for the second class mines to proceed with arrangements to resume work.

The sensational decline in the price of silver from a high point of $1.37 an ounce to a low point of 52 cents caused a number of the second grade mines to curtail work. The price then gradually strengthened until it appeared as though a general level would be established at around 60 cents per ounce. At such a price, the leading mines were in a position to make substantial profit and the silver mining industry once more became stabilized to a reasonable extent. Now, however, with the rise this week to upwards of 68 cents an ounce plus the premium on United States funds, bringing the total to around 75 cents, the second class mines are confronted with the likelihood of sharing the prosperity which has recently been confined to the leading properties.

In regard to the matter of a general move toward resuming work on all the mines, the question to be decided is as to whether it would be best to resume at present, or await a further possible decline in the cost of operations with a view toward going ahead at full blast in the early spring. Just now there are eight mines producing silver. In the order of their importance they are: Nipissing, Mining Corporation, Ceniagas, O'Brien, La Rose, Bailey, Aladdin-Cobalt and Hudson Bay.

A number of important discoveries in the operating mines has emphasized again the fact that there is still big scope for the development of important ore shoots in parts of the Cobalt field which have not yet been developed.

Cyril Knight, field geologist for the Ontario Department of Mines, made the statement to the Journal some months ago that as a result of the re-survey which he has been conducting during the past two summers, he has become convinced that there are certain sections in the Cobalt district where there are excellent possibilities and that in his opinion the field would still provide some favorable surprises. He pointed to these undeveloped sections as offering good chances of rewarding intelligent effort.

Among the important finds made recently are high grade ore shoots on the Nipissing as well as on the Violet property of the La Rose. In addition to these, is the fact that the O'Brien mine is producing some very rich ore. Indeed, from all three of these mines mentioned in this paragraph, there is ore being mined which compares favorably with the high grade shipments which first attracted world-wide attention to Cobalt.

Properties which are still idle in the Cobalt district, but with good ore reserves and desirous of re-opening at as early a date as may be considered advisable by the directors, are the Beaver Consolidated, Temiskaming, McKinley-Darragh, Peterson Lake and Crown Reserve. The Kerr Lake, which is operating at reduced capacity will also speed up operations just as soon as conditions are regarded as being entirely suitable.

At the first annual meeting of the stockholders of the Oxford-Cobalt Silver Mines, the by-law authorizing the purchase of the adjoining Waldman property was ratified. This deal involves the payment of 150,000 shares of the Oxford-Cobalt to Donald B. Russell who re-staked the Waldman last Fall. The old board of directors were re-elected.

The re-treatment of old tailings at the Coniagas continues on a big scale and the total tonnage now being handled at this property, inclusive of tailings, mine work, etc., exceeds 600 tons daily. With the arrival of winter, however, the handling of old tailings will be suspended until spring, although the handling of ore from the mine will continue uninterruptedly. The company will close its fiscal year at the end of next month and will show an output somewhat higher than for the past three years.

On October 20th, the Nipissing will disburse a dividend of 3 p.c., this being the regular quarterly payment. Total costs at the Nipissing are now understood to be under 35 cents an ounce, thus indicating a net profit of around 40 cents per ounce at the present price of silver. Production amounts to upwards of $160,000 monthly, thus indicating a net profit of around $80,000 per month. The current rate of dividends of 3 p.c. quarterly requires $60,000, and, it is obvious, therefore, that a considerable surplus is accumulating in addition to dividends.

Elk Lake and Gowganda.

An important conference is to be held in North Bay this week between Premier Drury, and the T. and N. O. Railway Commission. The question of building an extension of the Elk Lake branch of the T. and N. O. from Elk Lake to Gowganda will be considered. It is believed that in view of the many promising mineral discoveries in the district surrounding Gowganda, as well as the abundance of cheap labor, that the Government may now regard such an extension with favor. The territory to be served has big natural resources of proven merit.

Nothing definite appears to have been arranged in connection with re-opening silver properties in the Cane and Auld township district, but the higher quotations for silver is encouraging the belief that financial arrangements may now be made to work certain of the promising properties in that area.

THE GOLD MINES.

The Porcupine Field.

Numerous facts combine to place the Porcupine gold fields in a position where they should prove to be one of the greatest advertising factors within the Dominion. Rising production, proof of great depth and a general tendency to build big additions to the existing plants as well as the installation of new equipment on certain of the properties in the development stage are facts which stand out prominently in this field of big industrial progress.

The further favorable information that has come to hand with respect to each of the three leading gold mines of Canada, these being the Hollinger, Dome and McIntyre, each situated in the Porcupine district, is worth setting out in some detail.

In the first instance, the Hollinger Consolidated is treating an average of from 3,200 to 3,300 tons of ore daily, and there has been the general understanding that an increase of another 500 tons daily would be made in due course. However, it was not known on the street until to-day that an increase to about 5,000 tons of ore daily is not improbable in course of time. Officials evince their usual reticence owing to the fear of leading the shareholders to believe that such an enlargement may be expected right away. It is obvious that the additions required to so increase the tonnage would require considerable time to instal. It will be recalled

that the Journal's Northern Ontario Letter some months ago mentioned the Hollinger as being in line to soon realize an income of close to a million dollars a month and that certain writers expressed doubt about such an achievement. Yet such is now almost a reality, the monthly income being between $900,000 and $1,000,000. Officials at that time also drew the matter to the attention of the Journal correspondent, not out of the belief that such an achievement could not be accomplished, but on the strength of the fear that some unforseen obstacle might develop. For the same reason, it is probable that officials of the Hollinger will regard mention of 5,000 tons daily as being premature, but, nevertheless such is the record now being discussed and which has real prospects of ultimately becoming a reality. In connection with this, it has been learned by the Cobalt correspondent of the Journal, that the Hollinger has made arrangements to instal a Marcy rod mill for the purpose of finding out the grinding efficiency of such a machine. This mill will be run for a few months for the purpose of determining whether or not it is what its manufacturers claim. Should it do so, there are prospects of all subsequent additions to the grinding equipment being made up of these rod mills, and possibly ball mills, in preference to any further installation of stamps which have heretofore comprised the grinding equipment of the Hollinger.

In an interview with A. F. Brigham, General Manager of the Hollinger Consolidated Gold Mines, it was learned that the great plant has now attained an average capacity of 3,500 tons of ore daily. When it was mentioned to Mr. Brigham that the reports on the street have it that the plant is treating 3,800 tons daily, the manager made the reply that he is a believer in averages and that although the mill has actually attained a capacity of 3,800 tons per day over certain periods, yet it would not be advisable to take this maximum figure as a basis of analysis but that the achievement could be conservatively placed at an "average" of 3,500 tons per day. Mr. Brigham states that a total of between 1,700 and 1,800 men are employed at the mine and that the labor supply is abundant. From the foregong official details, and taking into account the fact that the ore on the mine contains approximately $10 per ton, the Hollinger income may reasonably be estimated at $35,000 every twenty-four hours. This is actually at the rate of $12,775,000 annually. The chief problem confronting the enterprise at this time is the question of hydro-electric power. With regard to this, it has been officially announced to your correspondent that the water supply in the storage areas is approximately the same as it was at this time a year ago, and that the power load now being carried is about twenty per cent. greater than at this time last year. This announcement is not altogether favorable, but with the rainy season just commencing, it will be another month or six weeks before the prospects for full power supply for the winter may be correctly measured. As matters stand, therefore, the Hollinger, with a monthly income of a million dollars a month is running almost neck-and-neck with the Crown Mines of Africa its chief rival as a gold producer for the position of world leadership.

Advice from the townships of Rankin and Doon where a promising gold discovery was reported last week is such as to hold out considerable promise for that area. The office of the Bureau of Mines at North Bay was visited by the Journal correspondent where maps are prepared for the guidance of prospectors showed between 40 and 50 mining claims recorded in the new district.

Information received from the Dome Mines goes to show that gold tellurides occur at the lower levels of the mine. Officials have known for some time that tellurides occur in the lower workings but have hesitated to make the fact generally known owing to being uncertain as to whether or not it occurs in any very great volume. This fact has not yet been determined and will not be until further extensive work is done. However, it is known that telluride does occur in spectacular quantities as so far opened up in the lower levels, and this is a factor which holds out hope of the Dome becoming as high-grade as its only Canadian rival, the Hollinger Consolidated. The telluride peculiar to the Dome is known as calaverite and is the richest form of telluride known, the gold content in the telurium amounting to upwards of 40 p.c. At the time of writing, it would be wrong for stockholders to conclude that calaverite is to enrich all the ore lying at the lower horizons of the mine. The extent of its occurrence may only be determined by further work, but the fact is regarded as important news.

The announcement that the Dome has encountered gold tellurides in its lower workings has served to attract more than ordinary attention, and the subject has become one of widespread discussion throughout the mining fields and in market circles. The belief is taking form that the Dome is about to fulfill the prediction made some years ago by the general manager of that time, Mr. Kaeding, that the mine was destined to take its place among the world's foremost gold mines. The high average of the gold content of the ore recently coming from the lower levels, coupled with the information that gold tellurides occur in encouraging quantities are factors which are giving birth to optimism on the part of stockholders in regard to the Dome.

After experiencing not a few reverses, those who are endeavoring to bring about a consolidation of the Dome Lake with the West Dome appear to be nearing their objective. It is said that a 5,000,000 share company may be incorporated, in which the Dome Lake will be given 1,500,000 shares with 1,500,000 to the West Dome Consolidated. The remainder would then be available with which to finance operations pending the time when production may be expected to become established.

Arrangements are being made to re-open the Hayden-Porcupine property, and toward this end a small force of men has been engaged. The property lies about four miles south-west of the Hollinger and is regarded as having considerable merit.

Headway is fairly slow in connection with the erection of a new milling plant on the Pearl Lake side of the McIntyre mine. It has been decided to go slow pending a decision in respect to the adoption of a method best suited to deal with the carbonaceous ores coming from the lower working of the mine. It is believed the foundations may be placed and the structure erected before winter sets in and that the installation of machinery may be carried on during the winter. In this way, the plant may be in operation by May. In the meantime, the present plant is operating at full capacity of about 550 tons of ore daily and the company is realizing an income of over $2,000,000 a year.

The Kirkland Lake Field.

Although no official statement has so far been given out, it has been learned on good authority that the bondholders of the Teck-Hughes Gold Mines have decided to deal leinently with the company. It is understood an arrangement has been made whereby the Teck-Hughes will commence paying off the bonds, the first payment to be $100,000 and that the indications appear to be that the entire indebtedness may be wiped out within less than four years. The ore in sight at the mine assures profit-

able operation for a number of years, while the possible ore as a consequence of going deeper may be estimated at a large amount. This means that the standing of the stockholders will not be interfered with and that they will probably stand in line to receive substantial dividends in due course.

Optimistic views are entertained with regard to the Teck-Hughes. It is believed that once the new additions now under way on the mill are completed the mine will be in a position to make between $15,000 and $20,000 net profit monthly. The company is capitalized at $2,000,000 made up of 2,000,000 shares of the par value of $1 each. Debts against the company amount to $500,000 plus several thousand dollars of accrued interest. Should net profits amount to the minimum estimate of $15,000 monthly, it would require but three years to retire the indebtedness. This rate of net profit would amount to about nine per cent. on the company's issued capital and would place the stockholders in a position to reap a very substantial reward for the money invested.

Reports from the Argonaut Gold are favorable. On the strength of good ore having been found in the lower levels of this property, together with the favorable outlook on the Elston-Duncan, the township of Gauthier has been staked out in a strip over two miles in width from north to south and across the entire breadth of the township from east to west.

It was reported this week that the Associated Goldfields had decided to curtail work on its properties at Larder Lake, but, at the time of writing, this report appears to have been based on the fact that work was stopped on one section with a view toward centralizing effort on the more promising part.

Good reports are coming from the property of the Crown Reserve in the Larder Lake district where values of $6 per ton are reported to occur in a wide ore body.

British Columbia Notes

Eureka Mine Re-opened.

One of the latest noteworthy mining events in British Columbia is the announcement of the re-opening of the Eureka mine, situated in the Cheam Mountains close to the town of Hope, and one of the oldest lode mines in the Province. It is being developed, according to authentic report, under auspicious circumstances. Attention, it is said, was directed to its possibilities by A. S. Williamson, who has been identified with the "Lucky Four" Mine in the same District. Messrs. Sperry & White, of Vancouver, have acquired control of the property. From work they have done, and from samples taken from bodies of ore recently opened, they have concluded that the proposition is worth a considerable expenditure. They are planning, therefore, to invest from $75,000 to $150,000 in development and plant. Confidence is expressed that the old property will become a large silver producer.

An early report of the British Columbia Minister of Mines, one of the first of which there is record, contains an interesting account of the first discovery of silver in the vicinity of Hope and, as the Eureka Mine is mentioned in this connection, possibly a few paragraphs of the same will stand publication at this date. They follow:

Silver ore was first discovered on the banks of the

Fraser, near Hope, and a lead was opened, by tunnel, at a considerable outlay, but nothing of any importance resulted.

The next discovery of silver ore was at Cherry Creek, in the Okanagan District, where ore of almost fabulous richness was found. At present, however, every effort to discover a well-defined workable lead has been fruitless, the very heavy character of the timber and superincumbent brushwood and soil forming an almost insuperable obstacle to successful prospecting.

True veins of silver ore were, however, finally discovered. This lead is of a far more valuable character Fort Hope, about 80 miles from the mouth of Fraser River, and six miles south of the town.

The first lead, called the Eureka mine, crops out about 5,000 feet above the river level, is well defined, four to seven feet in thickness and has been traced 3,000 feet. A tunnel has been driven in this lead for 190 feet. The ore is described as argentiferous gray copper, and has yielded under assay from $20 to $1,050 worth of silver to the ton.

During the time the above lead was being worked, another about three hundred feet distant was discovered. This lead is of a far more valuable character, and it is called the Van Bremer Mine.

The ore is described as chloride of silver, and has yielded under assay from $25 to $2,403 of silver per ton of rock. A quantity of the outcrop sold at San Francisco at $420 per ton. The lead is distinctly traceable for half a mile.

Tatlayoka Lake Area.

Wm. M. Brewer, resident mining engineer of No. 6 Mineral Survey District, B.C., returned recently from a three week trip into the section bordering on the Klinaklini river and Tatlayoko lake, where there is considerable activity in prospecting and development work. This section is north east of Bute Inlet, Tatlayoko Lake being west of Chilko Lake. While there has not been much mining done as yet the country is well mineralized and it is believed will become one of first importance. In 1920 twenty-nine locations of mineral claims were made on Chromium creek, a tributary of the Klinaklini river and arrangements were made to haul machinery for a small concentrating plant to be erected on the property of the Tatlayoko Gold Mines Company, Ltd.

The Provincial Mineralogist in 1920 described Tatlayoko Lake as lying at an elevation above the sea of 2,700 feet and the mineral claims at an altitude of approximately 5,900 feet. "The country rock" he continues "is a network of dykes, mostly basic, frequently cut by more recent acid dykes. These dykes are so numerous as to completely obliterate most signs of the original sedimentary formation."

"Cutting through this network of dykes there was seen out-cropping on the surface a quartz vein having a strike of about S 20' east and dipping to the east into the hill at an angle of 37'—very persistent in its course, but of variable width, varying from a few inches to several feet. I took a rough sample of this outcrop at one of the wide parts where it seemed to be most heavily mineralized and found it to assay: Gold, 3.50 oz.; silver, $26 to the ton, being ore worth about $85 to the ton.

"Associated with this quartz vein, apparently in lenses lying alongside the vein, were considerable quantities of stibnote—sulphide of antimony—mixed with quartz. These lenses assayed about the same in gold as did the main vein, and such experiments as I have been able to make did not indicate any increased gold values with an increasing percentage of antimony, from which I argue that the gold value is not associated with the stibnite, although it seems probable that the silver values are so carried."

After referring in detail to development work done on the particular properties in question the Provincial Mineralogist concerning the geology of the district says:

"The granite and other plutonic rocks forming the Coast Range mountains extend eastward as far as Tatlayoko lake; on the east side of this lake are the sedimentary rocks of the interior, and along this contact there is a strong probability that productive mineral deposits occur, particularly where the dykes from the main Coast upheaval have struck off into the sedimentaries. It is on this contact that the mineral locations of Portland Canal, the Telkwa, and of Lillooet are found."

OXFORD-COBALT SILVER MINES.

In the first annual report of the Oxford-Cobalt Silver Mines Ltd., announcement is made that the annual meeting will be held Sept. 19th. Features of the report are these: A by-law is being present which will authorize the company to purchase what was formerly the Waldman property. This ground became forfeited last fall through the drastic order placed into force by the Ontario government with respect to taxation, and was staked by Donald J. Russel, son of the president of the Oxford Cobalt. This Waldman property lies adjacent to the Oxford-Cobalt and shares the same vein system, and a deal has been entered into by which Donald B. Russell is to be given 150,000 shares of the Oxford-Cobalt stock for the sixty acres of ground staked last fall, this being made up of 20 acres in what was formerly the Waldman and 20 acres in each of two other adjoining claims.

In the directors' report on the Oxford-Cobalt the following information appears:—

The vein on which shaft No. 1 was started, crosses into the Waldman claim where the Keewatin formation is much shallower and it here shows at the outcrop a quite narrow shoot of cobalt ore with fair silver values; but the vein had not been opened up by the former owners due to its trend and proximity to the holdings of the Oxford-Cobalt Company. From the experience of the Beaver and Tamiskaming mines, both working in ground similarly geologically, it is expected to find the best values in the Keewatin near the contact with the underlying diabase rock. Hence, before continuing sinking shaft No. 2 to greater depth where the distance to the diabase has not yet been definitely determined, it appeared wise policy to test out extensions of our main vein on the Waldman claim.

"In early June, sinking by hand was started; almost with the first round high-grade cobalt ore was found. At about four feet down, this cobalt ore assayed over 600 ounces of silver. There is a wide fractured zone and the cobalt ore occurs in irregular shoots. Besides these stringers, there is a much better defined calcite vein that showed no silver at surface, but at six feet down with the calcite came in ruby silver and argentite. As sinking continued, this vein has steadily strengthened. At the present depth of 38 feet, it is very well defined and continues strong both ways from the shaft. At the bottom, it contains noticeable quantities of cobalt as well as ruby silver. Our policy is to continue sinking on this and establish a first level at about 75 feet deep near the contact. Power has been piped to this shaft, a collar, headframe and a hoist house completed.

"Further development can be conducted from the

The Canadian Miners' Buying Directory.

Acetylene Gas:
Canada Carbide Company, Ltd
Prest-O-Lite Co. of Canada, Ltd.

Acetylene Welding:
The Toronto Iron Works, Ltd.

A.C. Units:
Powley & Townsley, Limited.

Agitators:
The Dorr Co.
Can. Chicago Bridge & Iron Co., Ltd.
Horton Steel Works, Limited.

Air Compressors:
Belliss & Morcom, Ltd.
Laurie & Lamb

Air Hoists:
Canadian Ingersoll Rand Co., Ltd
Mussens, Limited.

Air Receivers:
The Toronto Iron Works, Ltd.

Alloy and Carbon Tool Steel:
Peacock Brothers Limited.

Alternators:
MacGovern & Co.

Aluminium:
Spielman Agencies, Regd

Amalgamators:
Northern Canada Supply Co.
Mine and Smelter Supply Co
Wabi Iron Works.

Antimony:
Canada Metal Co.

Antimonial Lead:
Pennsylvania Smelting Co

Assayers' and Chemists' Supplies:
Dominion Engineering & Inspection Co.
Lymans, Limited
Mine & Smelter Supply Co.
Pennsylvania Smelting Co.
Stanley, W. F. & Co., Ltd.

Ash Conveyors:
Canadian Link-Belt Company

Ashes Handling Machinery:
Canadian Link-Belt Co., Ltd.

Assayers and Chemists:
Milton L. Hersey Co., Ltd
Campbell & Deyell
Ledoux & Co.
Thos. Heys & Son
C. L. Constant Co.

Asbestos:
Everitt & Co.

Balls:
Hull Iron & Steel Foundries, Ltd.
Peacock Brothers Limited.
The Wabi Iron Works.
The Hardinge Conical Mill Co
The William Kennedy & Sons, Ltd.

Ball Mills:
Hardinge Conical Mill Co.
Hull Iron & Steel Foundries, Ltd.
The Wabi Iron Works.
The William Kennedy & Sons, Ltd.

Babbit Metals:
Canada Metal Co.
Hoyt Metal Co.

Ball Mill Feeders:
Hardinge Conical Mill Co.
Hull Iron & Steel Foundries, Ltd

Ball Mill Linings:
Hardinge Conical Mill Co
The William Kennedy & Sons, Ltd.
Peacock Brothers, Limited
Hull Iron & Steel Foundries, Ltd

Belting—Leather, Rubber and Cotton:
Canadian Link-Belt Co., Ltd.
The Mine & Smelter Supply Co
Northern Canada Supply Co.
Jones & Glasco.

Belting:
R. T. Gilman & Co
Gutta Percha & Rubber, Ltd.

Belting—Silent Chain:
Canadian Link-Belt Co., Ltd.
Hans Renold of Canada, Limited, Montreal
Jones & Glassco (Regd.)

Belting (Transmission):
Goodyear Tire & Rubber Co

Belting (Elevator):
Goodyear Tire & Rubber Co

Belting (Conveyor):
Goodyear Tire & Rubber Co
Gutta Percha & Rubber, Ltd.

Bins and Hoppers:
The Toronto Iron Works, Ltd.
Can. Chicago Bridge & Iron Co., Ltd.
Horton Steel Works, Limited.

Blasting Batteries and Supplies:
Canadian Ingersoll-Rand Co., Ltd
Mussens, Ltd.
Canadian Explosives, Ltd.
Powley & Townsley, Limited.

Bluestone:
The Consolidated Mining & Smelting Co
The Conlagas Reduction Co., Ltd.

Blowers:
Canadian Fairbanks-Morse Co., Ltd
Northern Canada Supply Co.

Boilers:
Canadian Ingersoll-Rand Co., Ltd.
Marsh Engineering Works
R. T. Gilman & Co.
The John Inglis Company
Wabi Iron Works.

Blue Vitriol (Conlagas Reg):
Canadian Fairbanks-Morse Co., Ltd.

Bortz and Carbons:
Diamond Drill Carbon Co.

Boxes, Cable Junction:
Standard Underground Cable Co. of Canada, Ltd
Northern Electric Co., Ltd.

Brazilian Rough Diamonds:
Diamond Drill Carbon Co.

Brazilian Mica:
Diamond Drill Carbon Co.

Buggies, Mine Car (Steel)
Hendrick Manufacturing Co.

Brazilian Ballas:
Diamond Drill Carbon Co.

Brazilian Rock Crystal:
Diamond Drill Carbon Co.

Brazilian Tourmalines:
Diamond Drill Carbon Co.

Brazilian Aquamarines:
Diamond Drill Carbon Co.

Bridges—Man Trolley and Rope Operated—Material Handling:
Canadian Mead-Morrison Co., Limited

Bronze, Manganese, Perforated and Plain:
Hendrick Manufacturing Co.

Buckets:
Canadian Ingersoll-Rand Co., Ltd.
R. T. Gilman & Co.
Hendrick Manufacturing Co.
Canadian Link-Belt Co., Ltd.
Marsh Engineering Works
Mussens, Ltd.
MacKinnon Steel Co., Ltd.
Northern Canada Supply Co.
The Wabi Iron Works

Buckets, Elevator:
Canadian Link-Belt Co., Ltd.
Hendrick Mfg. Co.
Peacock Brothers Limited.

Cable—Aerial and Underground:
Canada Wire & Cable Co.
Northern Canada Supply Co.
Standard Underground Cable Co. of Canada, Ltd.
Peacock Brothers, Limited

Cableways:
Canadian Mead-Morrison Co., Limited
Fraser & Chalmers of Canada, Ltd.
Mussens, Ltd.
The Wabi Iron Works
R. T. Gilman & Co.

Cages:
Canadian Ingersoll-Rand Co., Ltd., Montreal, Que
Northern Canada Supply Co.
Fraser & Chalmers of Canada, Ltd
The Electric Steel & Metals Co.
The Mine & Smelter Supply Co.
Mussens, Ltd.
The Wabi Iron Works

shaft to better advantage than from either of the other two shafts where the depth to the diabase is greater. Hence your directors recommend to the shareholders the purchase of the Waldman claim, and to acquire the two adjoining claims specified in the by-law which is being submitted for your approval."

The financial statement shows assets of $526,316 while liabilities amount to $452,151. The statement shows $616.67 cash on hand, with "subscriptions on call' amounting to $3,135.

TORONTO MINING QUOTATIONS.

Quotation on active stocks on Standard Stock Exchange on 27th September, 1921:

	High	Low	Last
Silver			
Adanac Silver Mines, Ltd.	1⅛	1⅛	1⅛
Bailey	2½	2¼	2½
Beaver Consolidated	28	25	26
Coniagas	1.60	1.60	1.60
Crown Reserve	11	10	11
La Rose	32	30½	31½
McKin.-Dar.-Savage	22	17	22
Mining Corp. of Can.	1.15	1.05	1.15
Nipissing	5.75	5.75	5.75
Peterson Lake	4½	4½	4½
Temiskaming	25	24½	25
Trethewey	11¾	10¼	11¾
Gold			
Atlas	18½	16½	18
Dome Mines	23.00	19.50	22.25
Gold Reef	2½	2⅛	2½
Hollinger Cons.	7.50	7.40	7.43
Hunton Kirkl'd G. M.	6	5½	6
Keora	10	7½	9¾
Kirkland Lake	35	31¼	35
Lake Shore M. Ltd.	1.34	1.31	1.33
McIntyre	1.98	1.94	1.98
Moneta	12	12	12
Newray Mines, Ltd.	4⅞	4½	4⅞
Porcupine Crown	16	16	16
Porcupine V. N. T.	19¼	18½	19
Preston East Dome	2½	2½	2½
Schumacher	24	21½	24
So. Keora	40	16	40
Teck-Hughes	17	15	16½
Thompson Krist	3	6¾	7¼
West Dome	7¾	6¾	7¼
West Tree Mines Ltd.	4	4	4
Wasapika Gold M. Ltd.	4¼	4	4¼
Miscellaneous			
Petrol Oil	22	20	21
Rockwood Oil, Gas	½	½	½
Vacuum G.	4½	4½	4½

METAL QUOTATIONS.

Following are the fair average prices for ingot metals (in less than car-loads):

Toronto	Cents per lb. 28th Sept. (Unchanged from last week).
Copper, Electric	17
Copper, Casting	16¾
Tin	35
Lead	6¾
Zinc	7½
Aluminm	27
Antimony	9

Dr. A. G. Miller and Mr. A. G. Burrows, of the Department of Mines, are examining Pre-Cambrian areas in Northern Ontario.

Mr. P. E. Hopkins is at Port Arthur. He visited Silver Islet and other silver mines in the vicinity of Port Arthur.

Mr. R. J. Ennis was in Toronto last week for the annual meeting of shareholders of McIntyre-Porcupine Mine Ltd.

Mr. Charles A. Richardson has been appointed sales engineer with the International Nickel Company of Canada, Ltd., with headquarters in the Harbor Commission Building, Toronto.

MINING CONGRESS AT CHICAGO.

We make no apology for once more reminding our readers of the fact that the twenty-fourth annual convention of the American Mining Congress and National Exposition of Mines and Mining Equipment will be held at the Coliseum, Chicago, from the 17th to the 22nd of October, inclusive. For this convention will be one of the first importance—it will be the most notable exclusively mining show ever undertaken. It will probably excel in importance almost any previous convention of a great business organization, and this by reason not only of its magnitude and the exceptionally representative character of the attendance that is expected, but also because it will aim at the creation of a constructive policy for the mining industry.

The Canadian Mining Journal will be represented at this convention by a booth which will be in charge of Mr. H. W. Thomson, our Western Manager.

EDITORIAL

ANOTHER STEP TOWARDS THE BAY.

Premier Drury has announced that the Ontario Government Railway, the Temiskaming and Northern Ontario, is to be extended seventy miles beyond Cochrane to a point near New Post on the Abitibi River. The work is to begin at once and a number of men will be employed this winter in cutting the right of way.

While the district to be served by this extension of the railway is not of much interest to prospectors, there can be little doubt that the improved transportation facilities will hasten the exploration of the Hudson Bay basin. The railway will, doubtless, later be further extended to tidewater, and then will come rapid exploration, and probably the establishment of mining and metallurgical industries in the far north. Already it is known that there are important iron ore deposits in the Belcher Islands. Improved transportation will bring larger numbers of explorers, and will doubtless, result in many mineral deposits being uncovered.

The country to be served by the seventy mile extension is expected to yield a considerable quantity of pulp wood. It is partly agricultural land, and this will be settled more rapidly as a result of railway building. There are important water powers that will be reached by the railway. Development of these water powers will be hastened by railway construction, and it is not improbable that electrification of the railway will make a market for much of the power.

The building of a railroad into undeveloped country is a venturesome undertaking. Much can be said for and against the spending of public funds in such enterprises. There can be little doubt, however, that the people of Ontario will approve of the extension of the railway to Hudson Bay. Development of the hinterland is an enterprise which appeals to many, and the bringing of Hudson Bay into commercial range with Ontario settled districts is something worth striving for. The Bay is only one hundred and fifty miles from Cochrane, but, with only canoe routes and snowshoe trails as connecting links, the distance is an effectual barrier to trade and exploration of resources. The extension now authorized will cut the distance down to eighty miles.

Those who are interested in mining development will get no great immediate assistance from the extension of the railway into the area north of Cochrane, but they will be pleased to see that the Ontario Government is sufficiently interested in development of the north to go on with the project that resulted, in 1904, in the finding of silver at Cobalt, and, later, led to the establishment of gold mining at Porcupine and Kirkland Lake.

MINING LAW.

In this number of the Journal one of our mining engineers outlines some aims of mining legislation. He contends that security of title must be the foundation of any good mining law, and urges that any existing law which does not properly secure title should be revised. Non-enforcement of good laws may result in danger to titles, but, where good laws are enforced, there should be certainty that title will be indisputable. It is, therefore, necessary to provide that enforcement of the law does not impose unreasonable burdens on either government or mine operator. Lax enforcement for a period has, at times, been followed by unexpected action which has led to loss of faith in the security provided for.

Periods of too lax and and too strict enforcement of provisions of a mining act are disturbances to security of title and should be avoided. We have had some unpleasant experiences in Ontario, because of unexpected action in the enforcing of regulations which made titles insecure because of comparatively small sums of money being unpaid at certain dates. The government was quite within its rights in enforcing the regulations which made forfeiture of property the penalty for non-payment of certain taxes, but the unreasonable nature of the penalty and the non-enforcement of it had led to carelessness on the part of owners of property. Then,

snddenly the titles to valuable mining properties were found to be in danger or already lost.

The unfortunate result of enforcement after a period of non-enforcement was an impression created that the mining regulations were tricky, and that titles were not as secure as they had previously been thought to be. This undonbtedly did considerable harm to the mining industry in Ontario, as it led to many unfavorable comments on the existing mining laws. Not only was the penalty too severe for the offence; but the existence of the penalty had been lost sight of owing to non-enforcement. Some companies received no notice of taxes being due, and were not warned of penalties until they learned too late that their property was forfeited. It is not surprising that there was an outery when the law was enforced under such circumstances.

The plea for simplicity in mining laws should meet with general approval. Voluminous statutes are too often the result of lack of thorough study on the part of our legislators.

Our contributor does not deal at length with the relative merits of leasehold and freehold tenure. He suggests that the tax payments on freehold property, like the lease payments, will not be paid indefinitely, and that much land comes back to the Crown whether held as freehold or as leasehold.

Of much interest to the pioneers of the mining industry are the suggestions made for encouraging exploration and development of mineral areas. The imposing of charges at every turn where the Government and prospector come in contact is criticized, and the suggested elimination of minor fees is worth consideration. The discovery clause in the mining act is considered obsolete, and the enforcement of it impossible and not worth attempting. It is a law that, if taken seriously, would be morally degrading, but, even treated as a joke, it is not without bad effect. The prospector should not be asked to perjure himself in order to obtain rights to property which under any sensible law would be gladly given him in order that he might develop the mineral deposits on it if there should prove to be any worth the effort.

Non-enforcement of provisions of mining laws, as of other laws, comes naturally from recognition that such provisions are unfair, or are unsuited to the circumstances, or are, for other reasons, objectionable. Undue delay in amending regulations of such character can only result in annoyance and dissatisfaction. Undue haste in changing mining laws is not liked and is not urged, but in common decency we should bury the dead.

THE DIVINING ROD.

Of all methods of finding minerals the method of the forked stick is perhaps the most interesting. Every now and then there is a new story of the success of this method. Our correspondent at The Pas sends us, for publication in the Journal, an account of a recent exhibition of skill in locating minerals and metals in Manitoba. It will be found on another page. It is a good story and told in a very convincing manner.

Prospecting for minerals is an arduous task, and is becoming more and more difficult as the search proceeds. It would be a great gain to the industry if an instrument could be found to do the work that now requires much labor and considerable good luck. There would be lots of employment for the divining rod, if it were proven of use in the search for minerals. Its chief value in the past has been the basis it has given for mining romance. The prospector likes fairy tales as much as anyone, and he will doubtless be doubly interested in one which compares favorably with his dreams of how he made the "big strike."

3,000,000 *H. P. FOR ONTARIO.*

Sir Adam Beck promises that his engineers will soon have something new to show in the way of electrical equipment. Speaking of a scheme for development on the St. Lawrence River he says "we are going to be the pioneers of the greatest development of its kind." His scheme would make the St. Lawrence a navigable stream and regulate the level of Lake Ontario. Further information on this project will be awaited with interest. Water power development is of great importance in the mining and metallurgical industries. Sir Adam predicts that 3,000,000 h.p. will be developed in Ontario from the Niagara, St. Lawrence and other sources.

EDITORIAL NOTES.

The power situation in Northern Ontario has improved greatly during the past week. Heavy rains have fallen, and there is now little chance of a repetition of the power shortage of last year. If a normal amount of rain falls during the month, the water supply will meet requirements. Already it is claimed that the water supply for Cobalt and Kirkland Lake mines will do so. The three companies at Porcupine can make good use of all the power obtainable there this winter. Given adequate power, the gold mining companies will doubtless materially increase operations.

The Tin Can Portage is said to be the terminal of the authorized Ontario Government Railway extension. The pioneers who named the portage will receive no thanks from the Drury Government if the project proves unpopular.

Coal from Nova Scotia is coming to Toronto this week. A cargo of 3,000 tons is on the way. A trial shipment by the all water route was made some weeks ago and the bringing of this second cargo indicates that the business is feasible.

The productive season for hydraulic operations in the Yukon is nearly closed. It is estimated that the Dawson area has yielded about one million dollars this summer. This will be added to by dredging operations which continue for some time after the first frosts.

The report on coal statistics for the first six months of the year shows that production was 86 per cent. of that during the corresponding period last year. Importations were larger this year than in 1920. Exports declined one third. We imported more coal than we produced, the amounts being respectively 8,319,246 and 6,783,060 tons. Substracting the amount exported we have an indicated coal supply of 14,233,302 tons for the six months, or more than in the corresponding periods of 1919 and 1920.

Reports from Vancouver Island indicate that there is now a better market for coal than for some time. This is said to be not caused merely by the approach of winter, but by greater demands of the mercantile business of the North Pacific.

Ore carrying five per cent nickel is reported to have been found at the Gabbro mine, which is situate on the west coast of Vancouver Island. The nickel is contained in pyrrhotite. It is with this mineral that nickel minerals occur in the ore at Sudbury.

CHANGES IN TREATMENT CHARGES.

Nelson B.C.: Changes in the schedule of treatment charges imposed by the Canadian Consolidated Mining & Smelting Co., of Trail B.C., are foreshadowed as a result of a recent conference between representatives of the independent mine operators of the Kootenays and the management of the Company. The smelter proposes, it is stated, to pay for 95 per cent of the silver and 90 per cent of the lead irrespective of the zinc content of the silver lead ores of this section of the Province. Hitherto these figures have obtained for ore containing not more than 10 per cent. When, however, the zinc exceeded that percentage there was a deduction of ½ per cent of silver and 1 per cent for each unit of zinc in excess of the 10 per cent. The treatment of the zinc in such ore is to be reduced from over 60 cents per unit to 50 cents or possibly less. On the average Sloean ore going to the smelter it is estimated that this will mean a difference in favor of the operator of about $1.50 a ton. The Company also proposes to amend its present deduction for exchange of 5 per cent to 3 per cent. The silver is chiefly affected by this as practically all of it is marketed in the United States. For lead ores settlement will be at 90 days based on the price of the metal either on the day of arrival or the day of sampling. The advisability of taking the London or Canadian quotations instead of that of New York as a basis for settlement for lead also was considered. The London quotation is less than that of New York but more than those in Oriental countries where a large part of the Company's lead is marketed. The disposition thus shown by the Company to co-operate with and to show consideration for the difficulties of the independent mine operators of the Kootenays has given the latter heart, renewed confidence, and inspired a spirit of assurance that the present dull times are soon to be displaced by prosperity. There is no doubt that the Trail Smelter will get most of the ore that of late has been going across the boundary and it is equally certain that the operators, granted what they feel is fairer treatment, will be glad to give their business to the Canadian concern. Already a car of ore, taken from a small stringer of high grade ore in the Ruth Mine, Sandon, has been diverted to Trail.

The Rambler-Cariboo Mine has been leased by W. A. Cameron and associates and the lessees expect to open up new ground. With the predicted new Trail Smelter Schedule it is expected that it will be possible to operate the Mill at a profit.

The Mill on the California, Athabasca and Exchequer Groups, near Nelson, who is under bond to J. R. Cassin and associates, of Spokane Wn., was given a trial run recently with satisfactory results. Mr. Cassin says that it now is a really fine working mill. There are two batteries of stamps and the plant capacity is 50 tons a day. The chief new feature is that the Senn amalgamating table is not being used while two Deister tables have been introduced into the flow sheet. The Zeigler flotation machine is working efficiently. The flotation plant was added last year together with a Hardinge conical ball mill. There is said to be sufficient ore blocked out to keep the mill running steadily for years.

Trail B.C.: During the week 1st to 7th September there were shipped to the Trail Smelter, Consolidated Mining & Smelting Co., 6552 tons of ore and concentrates, the greater part of which came from the company's properties. The total receipts for the following week were 5,115 tons. Forty two independent mines have shipped to this smelter so far this year. In the last few weeks the shipping list has been growing to a marked extent.

DOME'S NEW OREBODY.

A body of rich ore has been encountered at the seventh level at the Dome mine. It is reported that the average value of the portion exposed is around $40. As yet the development has not advanced far enough to permit estimates of quantity. The "Northern Miner" says of the new find: This new body which is in the east end of the mine, and in the ground thought valueless, has the usual Dome characteristic of great irregularity in outline. Only one dimension has been got so far, and it is about 30 or 40 feet. The impression was received that it will take a lot of work to show up its boundaries, and that the present known dimension cannot be said to be its width, or its length. The material is peculiar. It is a slaty sort of ore, very hard. It often takes two shifts to drill off a round that in other parts of the mine takes five hours.

As the orebody occurs in slate quite a lot of that material is present in the ore. There is a high proportion of calcite, considerable quartz, and in places very massive sulphides.

It runs higher than usual in silver content, having as much silver, by weight, as gold.

The new orebody cannot be connected up with any other known body in the mine. The management is now endeavouring to get some idea of its extent.

Mr. George Mackenzie, secretary of the Institute of Mining and Metallurgy was in Toronto last week.

Mr. Robt. Bryce is in New York.

Mr. Ellis Thompson who has been engaged in geological survey work in the Goudreau district during the field season has returned to Toronto.

The Perfect Mining Law

By "KAY SEE (1950)."

The perfect mining law may be defined as a mining law which satisfies the prospector, protects the investor and the public, makes smooth the path of the operator, and brings a maximum revenue to the Crown. Such a law is an impossibility on account of the diverse interests involved.

In any mining legislation the following aims should be secured as far as possible:

1. Security of title.
2. Simplicity in administration and operation.
3. Protection of the public interests.
4. Encouragement of prospecting and mining.
5. Revenue to the Crown.

There may be a difference of opinion as to the relative order of importance of these aims. The lawyer would put No. 1 at the bottom of the list and the mining tax collector would transpose No. 5 to the top of the list, while many would say that No. 4 includes Nos. 1 and 2 and that Nos. 3 and 5 are not worthy of consideration.

1. Security of Title.

Security of Title must be the foundation of any good mining law, and any mining law which, through its enforcement or administration, induces doubts regarding security of title should be immediately revised. Doubt as to security of title is fatal to the continued prosperity of the mining industry in any country. In countries with a stable form of government, security of title is easy to provide for, and will exist if the laws are just and are strictly enforced. Lax enforcement of law encourages lax compliance with law, and in the mining industry this may endanger security of title. Where title to mining lands depends on compliance with regulations governing staking, assessment work, payment of taxes, etc., such laws should be automatic in action. Non-compliance with any regulation, the penalty of which is forfeiture of property, must be instant in action and without any appeal, otherwise the law will not be observed and is of no value. On the other hand, if the necessary regulations are observed title should be indisputable.

Care should be taken that the regulations do not ask for impossibilities. This will be further referred to under heading 4. As an example of the evils resulting from a law which is not automatic in its penalties, may be cited the 1920 forfeiture of the Ontario Department of Mines for non-payment of taxes. The penalty provided for by the Mining Tax Act of Ontario for the non-payment of the acreage tax on mining claims is forfeiture to the Crown. The weakness of the Act lies in the fact that such taxes have to be two years in arrears before the penalty can be enforced, and then only after advertisement and notification to the owner when possible. On account of the expense involved for advertising, search of title for notification, etc., the forfeiture penalty is only enforced every few years. The fear of immediate forfeiture for non-payment of taxes being removed results in a false feeling of security and eventually entire forgetfulness of the tax. On the rare occasions that the law has been enforced a few innocent owners of mining lands have lost valuable property through the neglect of agents in not paying the small sum due in taxes, and the cry has been raised that title was not secure under the Ontario Mining laws. If the penalty for non-payment of taxes on mining property when due were forfeiture to the Crown, instant and without appeal, the taxes would be promptly paid. All government licenses to hold mining property should state concisely all regulations the penalty for the non-observance of which is forfeiture to the Crown.

2. Simplicity in Administration and Operation.

This will follow if the law itself is simple, but a simple law is not allowed to exist for any length of time. Were it possible to draw up a mining act before any of the mineral rights of a country were alienated probably a better law than any at present in existence could be thought out. Generally, however, a mining law is not only considered after the discovery of mineral, and the rights of those who have already acquired mineral holdings must be considered. This may include railway companies, lumbermen, farmers, and the original prospectors. The first mining law is generally drafted with a view to encouraging the prospectors and operators; mining rights are acquired easily and taxes are light. Before the long the need of increased revenue is felt and taxes are increased. Today the creed that the national resources of a country belong to all the people is in the ascendancy and legislation is governed by this theory. Every new group of administrators and legislators consider it necessary to add to the existing legislation. The result generally is a cumbersome and complicated mining act. Practically every mining act could be improved if pruned 50 per cent. An essential requirement for the successful administration of any mining act is that the administrator should keep in close contact with all branches of the mining industry.

3. Protection of the Public Interests.

This includes two questions: The protection of the interests of the state or the citizens as a body, and the protection of the individual

If a mining act is lenient regarding the acquirement and holding of mineral rights, large areas of mineral lands may be held by a few men and, further, the control of certain essential minerals might be in the hands of a very small group. Neither of these conditions are desirable, although the same result can be obtained by purchase. The question as to whether mineral rights should be granted in fee simple or only by lease is a moot one, although in practice there is really not much difference. If of value only for mineral, the land will eventually revert to the Crown after the mineral is exhausted. Under the leasing system sufficient time to mine all mineral must be given, so ultimately the result is the same. The Crown regains possession of the land after it is of no further value. The advantage of the leasing system is that the land is more apt to be worked. It might be said that any land tax is really a lease. The protection of the individual would be provided for by legislation covering hours of labor, working conditions, protection of wages, sanitation in mining villages, workmen's compensation, blue-sky legislation, etc.

4. Encouragement of Prospecting and Mining.

During periods of new discoveries, especially if of high-grade ore, boom conditions will exist whether the legislation governing prospecting and mining is good or bad, but when conditions are normal, and more particularly in periods of depression in mining, an act which is considered by the prospector and operator to be unfair may do a great deal of harm. Assistance to the mining industry may be provided by the State in

two ways: 1st, by removing any obstacles in the way of mining and 2nd, by direct assistance or encouragement.

Obstacles to be removed may include previous legislation which has become obsolete, working conditions which are found to be a hardship, and fees, taxes, etc., where such do not produce a revenue commensurate with the cost of collection and the irritation produced. A Prospector's License should include all fees for re-recording claims, taking of affidavits, search of titles, etc. The payment of a small fee for every contact with the government produces a feeling of resentment and often does not much more than cover the cost of collection. Care should be taken that the prospector is not asked to comply with an impossible condition. The discovery clause in most mining acts is an impossible law to comply with, and yet before a prospector can stake a certain piece of ground he is required to take an affidavit that he has found valuable mineral which will make a mine workable at a profit. A strict interpretation of this regulation shows that close to 100 per cent. of the claims held in Ontario have been acquired by perjury. A prospector may feel reasonably sure that a vein extends into a certain area and that he can sell the land for a good sum, but the cost of proving the value of discovery is far beyond his means. He is entitled to that land and should not be asked to perjure himself to obtain it.

Where working conditions are hard to comply with these should be modified.

Direct assistance can be given to the industry by the building of railroads, roads or trails, by Geological work and maps, and in some cases by bonuses and the erection of treatment plants.

Revenue to the Crown.

The revenue derived from the mining industry should be taken from the successful mines. Very little, if any, revenue should be expected from the prospector and the mine in the development stage. The tax should be in profits and should be graduated so that those best able to pay would contribute the most.

GOLD DISCOVERY IN B. C.

The report of a gold discovery never fails to cause excitement and such has been the effect, especially in certain sections of the interior of British Columbia, of the news that a discovery, apparently of some importance, has been made in the Lillooet District. There seems to be some confusion as to the exact location of the latest find. Statements have been made that it is on Gunn Creek in the Bridge River Section. That there is gold in the latter country is known, but it is not this that has created the recent interest. The center of attraction now is the Taseko (Whitewater) River region and the recoveries being made from claims staked on Iron Creek, a tributary of Taseko River. It is in this vicinity that the Limonite deposits recently investigated by the Provincial Government are located and report has it that members of the exploratory party, which spent the 1920 season on the Taseko, have their attention directed to the occurrence of gold on Iron Creek. H. Taylor, an old prospector, is credited with being the original staker. He and his associates have been making considerable recoveries of gold, coarse and rough in character. Indications are that the precious metal has been carried but a short distance and diligent search is being made for the Mother Lode. There is no doubt that next season will see much prospecting in this part of British Columbia.

MORE GEOLOGICAL WORK WANTED.

By J. J. O'CONNOR.

The active interest that is being taken by the Geological branch of the Ontario Department of Mines, in mapping the mining districts now under development and exploration, is appreciated in the highest degree by mining operators and prospectors. The work of the Departmental geologists is being carried out in the most thorough manner, and with all the rapidity possible under a limited staff, and limited seasons. Additional to the areas now under development and exploration, these geologists are extending their efforts to wholly undeveloped areas, mapping formations, and blazing the way for pioneer prospectors, in a way that is rapidly extending the field of operation, and making possible the finding of economic mineral deposits, that might otherwise remain hidden indefinitely.

This branch of the public service should be developed to the fullest possible extent, nothing should be left undone to enlarge and amplify its resources in men of the caliber and qualifications, of the geologists that are now pioneering the way in the unmapped portions of the mineral area.

The staff of field geologists should be so increased, that it would be possible to cover the mineral bearing area of the Province within a reasonable period of time. With what has been accomplished by scientific and reasoned methods of determining geological formations, together with their economic possibilities, seems to point to the lines that should be followed by the Department of Mines in an intensive manner, until the survey and mapping covers the entire mineral belt traversing the northern portions of the Province.

The vast unexplored areas of Northern Ontario, are of such immense extent, that it will take years of the most persistent geological effort to adequately map and outline the formations, and demonstrate the mineral possibilities of the various sections. Splendid work has been, and is being done by the field staff of the Department of Mines. So much yet remains to be done in this direction, that, in the light of what has been accomplished by geological research in the field, and mapping of mineral areas, it would seem that no branch of the public service offers greater attractions for the expenditure of public monies, than that of the Geological branch of the Department of Mines.

Northern Ontario presents the greenest of green fields for the further extension of geological effort. The vast white spaces that now cover ninety per cent of the map, from the Ottawa river to the Manitoba boundary, should be replaced by colours indicative of the geology and mineral possibilities of this territory.

Northern Ontario is served by thousands of miles of railways, splendid rivers, streams and lakes, offering reasonable passage to its most remote confines, and only awaits the pioneer geologist to make its possibilities known.

As this service grows, so will the mineral production of Ontario grow. One is dependent on the other. They must go hand-in-hand.

COPPER IN SHETLAND.

An important and rich discovery of copper has been made in Shetland. The lodes thus far proved give a high percentage and already half a million tons of copper ore are in sight. Experts and engineers are laying down mining plants and it is expected mining will commence next month.

Silver Mining Gaining Ground

Good Results Being Obtained at Nipissing and La Rose.

Silver mining in the Cobalt district is gaining ground, and the indications appear to be that the production of silver from this field will be higher during 1921 than during the preceding year. This fact has a tendency to encourage the belief that under the normal conditions which are gradually developing, the mines of this district will be able to maintain their output for quite a number of years.

The Coniagas is producing at a higher rate than for some years, while the same is true of the La Rose Consolidated. The Mining Corporation and the O'Brien are each maintaining high yields, while the Nipissing is gradually adding to its rate of production as compared with the opening of the current year.

Two of the more important discoveries to be made in many months took place in recent weeks, one on the Nipissing and the other on the Violet property of the La Rose. The vein on the Nipissing is from four to five inches in width of high grade ore and is accompanied with a large amount of mill rock. The vein itself carries ore which assays several thousand ounces of silver to the ton. Massive pieces a foot wide, two feet long and four or five inches in thickness of $2,000 ore may be seen at the mine as a result of the recent favorable developments. This high grade orebody, taken together with the fact that the average silver content of the mine's reserves is over 40 ounces of silver to the ton tends to indicate that the Nipissing will maintain an output of not far under $200,000 a month.

In addition to such big achievements on the company's Cobalt properties, the Nipissing is conducting careful investigations in certain of the other mining fields and may reasonably be expected to acquire more paying mines as a guarantee against the working out of the Cobalt deposits. The Nipissing has optioned two properties in the Porcupine district, these being the Edwards claim near the Dome mines and the Rochester property north of the Hollinger. It is the intention of the company to conduct an exploration campaign on both properties by using diamond drills. A dividend of 3 p.c. will be paid Oct. 20th to stockholders of record Sept. 30th.

The new vein on the Violet property of the La Rose has been drifted on for about 30 feet at the 570-ft level and has a width of from four to five inches. Some exceptionally rich ore is being bagged, while a substantial tonnage of medium grade ore is being opened up. It is now evident that the output of the La Rose for the current year will be the highest for some years. Some high grade ore is also being taken out of the Princess property of the La Rose as a result of taking out one of the floors in an old drift.

The annual meeting of the Kerr Lake Mining Company has been called for Sept. 26th. A meeting of the directors of the company was recently held at which a dividend of 12½ cents a share was declared. The annual statement has been delayed but is expected to be in the mail almost any day. It is awaited with more than usual interest owing to there being various reports relative to outstanding success on the company's New Zealand properties where dredging for gold has been under way. As regards speeding work up to full capacity on the company's Cobalt property it is not believed such a move will be made at present, although the strengthening which has recently taken place in the price of silver holds out promise of a general resumption of work being possible within a reasonable short time.

Attention is turning again to the South Lorrain district with renewed interest as a result of a discovery of high-grade ore at the 300-ft. level of the Haileybury Frontier property. It is stated that at a distance of about 30 feet from the bottom of the shaft, the drift has entered a rich shoot of ore which has the appearance of being important. High-grade ore is being bagged and the result of further work is of the utmost importance to the enterprise.

The mill on the Keeley Silver Mines is operating steadily and is producing a concentrate which contains about 1,800 ounces of silver per ton. A carload of these concentrates was shipped during the past week and places the Keeley on the list of substantial producers.

THE ALEXANDRIA MINE.

Excellent progress is being made in the development of No. 7 Colliery, the newest of the Scotia Company's chain of coal producers. The sod was broken for this colliery in September 1920 simultaneously with the closing down and dismantling of the Scotia colliery which became exhausted. No. 7 is in the vicinity of the old Scotia so that the men who formerly worked at the Scotia colliery were transferred to No.7 thus continuing them at work at convenient distance from their homes.

The first coal was hoisted from No. 7 in October last The average daily output is 400 tons, some days reaching 500 tons. These figures are eloquent of rapid work done in placing this colliery among the substantial producers of the Sydney Mines district.

The deeps are down 1,250 feet. No. 1 levels north and south are in 300 feet with ten rooms. No. 2 levels north and south are half the distance of the upper levels and will soon be producers.

Following a well thought out plan the mine is being rapidly opened up and each month adds to a steadily increasing output. The only factor in preventing No. 7 colliery reaching its maximum output at an early date is the depressed conditions of the coal trade. However, development work will go on and when the market expands N. 7 will do its part in filling the demand.

The mining is done by machinery, and not only is the mine very well laid out for economical capacity production and convenient working, but the mechanical equipment is excellent. The seam is about five feet thick and the coal of splendid quality.

The opening of the mine is one of the most important advances made in the Sydney Mines coal field during the regime of Alex S. McNeil as General Superintendent, and in deciding upon its location and laying out Mr. McNeil brought to bear his wide knowledge of practical and economical coal mining. The rapid progress made in opening and developing the mine was largely due to the active and personal interest taken by Mr. McNeil in pushing the work ahead. For these considerations No. 7 is generally referred to as Alexandria mine, and the present satisfactory state of the development work warrant the assurance that in a short time the Alexandria mine will become one of the most important producers in Cape Breton.—Glace Bay Gazette.

ACTIVITY IN BRITISH COLUMBIA COLLIERIES.

Vancouver Island collieries evidently are pushed to meet the market demands these days. Recently there has been a marked revival of activity. The Canadian Western Fuel Corporation, Nanaimo, has all its mines, No. 1, Herewood, Reserve, and Wakesiah, in full operation. In the course of the last few weeks this Company produced in one day a total of 2,800 tons which closely approaches, if not actually establishing, a record. The shaking up of this industry, the wheels of which have been moving slowly and uncertainly for the greater part of the summer, is not entirely due to the natural increased domestic requirements with the approach of winter. Nor is it due altogether to the unsatisfactory conditions as to production in the State of Washington where a recent strike, an investigation by a Commission on which the State was represented, the presentation of a report acceptable to the Operators and repudiated by the miners, have very seriously affected production. The improvement is said to be explained to a large extent by the greater demands of the mercantile business of the North Pacific.

The Canadian Collieries (D) Ltd., also, are working at normal at Cumberland and perhaps somewhat better than than the normal rate as to production at the Extension Camp. The former collieries, no doubt, have been slightly affected as to their showing by the closing down of No. 7 Mine, although its production never was great and Nos. 4 and 5 doubtless can be speeded up sufficiently to make up the difference.

The Granby Consolidated Mining Smelting & Power Co's collieries at Cassidy (V.I.), which slowed up for a short time, now are turning out about 1,000 tons a day. This is significant. The greater part of this coal goes to Anyox where, with a mixture of coal from the Interior, it goes through the by-product coking ovens in order that coke may be provided for the company's copper smelter at that mining camp. The maintenance of coal production to continue mining and smelting operations at Anyox notwithstanding the present unsatisfactory world condition as to metal markets. It certainly would seem to betoken confidence in an early return to more nearly normal conditions in respect of the copper mining industry.

There is one outstanding feature to the coal mining of the Nicola-Princeton section of the lower British Columbia interior, namely, the vigorous opening up of the Coalmont field by the Coalmont Coal Company. Development is proceeding there along such lines and on such a scale that before long the Company should be one of the considerable producers of the Province. An aerial tramway was installed recently which at first did not give satisfaction but now, a few alterations having been made, is working most successfully.

In the Crow's Nest Pass there is as yet no special evidence of improvement. The mines of the Crow's Nest Pass Coal Co. at Coal Creek and at Michel have been working five days a week. The coke ovens at Fernie are idle. Those at Michel are active, the output meeting the requirements of the Trail Smelter and the smaller demands of the several minor markets to the immediate south of the British Columbia border. The Corbin Coal and Coke Co. also is producing at about the usual rate and are engaged in the opening up of some new ground.

Pacific Coast Coal Co.

The property of the Pacific Coast Coal Co. Ltd., consisting of the Morden Mine and considerable undeveloped coal areas on Vancouver Island, would have been put up at tax sale by the Provincial Government on October 12th next if the ordinary procedure had been followed. But, had this been done, the claims of coal miners for back wages, aggregating $71,326, might have been adversely affected. The tax sale, therefore, was postponed to December 1st next. Meanwhile it is likely, should there be no settlement in the interim, that an order of the court will be asked for authorizing the sale of the property for the satisfaction of the wages in arrears. In such an event the purchaser, of course, would be called upon to assume such liabilities as the overdue provincial taxes.

Aveling Coal Co.

The Aveling Coal Co., Telkwa, B.C., is making preparations to take advantage of the growing demand for coal in northern British Columbia. That the coal is available, that it is of good quality, and that considerable market exists at Prince Rupert and other points along the line of the Grand Trunk Pacific Ry., are facts long apparent. The problem appears to have been that of transportation. This has been tackled seriously during the past Summer and, with the construction of a bridge now underway, in which the provincial government is lending financial assistance, it is likely that local coal will be available to the people of northern cities and settlements this winter.

LIQUID OXYGEN EXPLOSIVES.

The Bureau of Mines is conducting experiments at its Pittsburgh (Pa.) station with a view to making the use of liquid oxygen explosives practicable in certain mining and quarrying operations. The increasing cost of dynamite and permissible explosives at the time the United States entered the World War caused the Bureau of Mines to investigate all possible substitutes. It was found that the Germans used liquid oxygen explosives extensively in non-gaseous coal mines, in quarries and iron mines, as well as for destructive purposes in French steel plants. As eminent physicists are promising great improvements in liquefying apparatus that can be used for the production of cheap oxygen, it is possible that the explosive will become so cheap that it will displace dynamite and other explosives where conditions permit its use.

DALY MINES CO. LTD.

Stewart B.C.: Pat Daly is planning the further development of the "Big Missouri" Group of Mineral Claims in the Salmon River zone, Portland Canal. The diamond drilling and exploratory work carried out under Sir Donald Mann does not convince Mr. Daly that this property is without a future. On the contrary he is sure that the ore is there and that it is there in quantities that will make one of the big mines of the district. Mr. Daly explains that two Companies have been formed, one a holding company incorporated in the United States and known as the "Portland Canal Mines" and another incorporated in British Columbia and known as the "Daly Mines Co., Ltd." It is stated that the former's stock was well received in New York and that all that is necessary will be available for development.

The Divining Rod

Experiments in Northern Manitoba.

By REECE H. HAGUE.

The subject of the so-called "divining rod" is one which never fails to rouse a controversy in scientific circles and the writer fully realizes that technical men are very adverse to admitting its powers. At the outset he desires it understood that the material included in the following article is garnered from men who have been convinced of its efficacy through association with a man who claims power over it and not through any personal conviction that is is infallible. He has endeavoured to keep an open mind on the subject as the experiments which have been carried out in his presence have not been of a sufficiently important nature to justify him expressing a personal opinion on the matter.

Early in the prospecting season which is just drawing to a conclusion in Northern Manitoba, Professor R. C. Wallace received a communication from A. V. Arnott of Roblin, Man. requesting that he be allowed to accompany the Commissioner for Northern Manitoba on a trip through the mineral belt, in order that he might have an opportunity of trying out the power of the "divining rod" in locating minerals.

Professor Wallace complied with Mr. Arnott's request and the latter joined a party proceeding to Elbow Lake and other points in the mineral belt and during the trip succeeded in convincing those whom he accompanied that he had some power in locating mineral deposits.

Several Tests Applied.

One member of the party stated on his return to The Pas that severe tests had been given Mr. Arnott. On several occasions one member of the party would precede the others crossing a portage and would bury a coin somewhere along the route, which would be unfailingly located by Mr. Arnott, through the medium of a twig of poplar, willow or other wood which he held in his hands and which would turn sharply immediately he came over the hidden object.

Mr. Arnott also followed the leads of mineral bearing viens and was willing and anxious to undertake any tests which would serve to convince the sceptics by whom he was accompanied that he had the power he claimed.

By the time the party returned to The Pas there was not one of the men who had accompanied Mr. Arnott, but who would admit that the latter had some peculiar power and could really locate mineral by means of his wand.

While in The Pas Mr. Arnott gave private demonstrations in the writer's rooms. A silver coin or mineral sample would be placed on the floor and Mr. Arnott would walk towards it. Immediately his hands were over the planted object the twig which he held in his hands would bend, the efforts of men who held the opposite side to Mr. Arnott being impossible to restrain it.

His Excellent Credentials.

Mr. Arnott stated that he had spent some years in India locating water for the British government and produced excellent credentials as to his success. He intimated that he had considered he might have the same power to locate minerals and took the trip to Northern Manitoba to try out the process. He has made no experiments as far as oil is concerned but thinks he would be equally successful in locating oil pools. He contends that the only difference between an underground water well and a mineral deposit is that when the latter is disclosed their is a certain tingling in the fingers which is not noticeable when the presence of water is shown.

Iron bodies do not affect, the wand, he states, but it is susceptible to any mineral such as gold, silver or copper.

Mr. Arnott recently returned from a second trip to The Pas mineral belt, where he made extensive investigations and returned to The Pas more than ever convinced that he had the power he claimed.

While in the Elbow Lake region he discovered what he contends to be a mineralized area running beneath the heavy muskeg and he is so confident that he is not mistaken that he has staked claims and agreed to pay a sum of money to prospectors in the district to do work on his property during the coming winter, stripping the muskeg and diselosing what lies beneath. Other prospectors, convinced that Mr. Arnott is conscientious in his claims, have also staked in the locality.

Convinced of His Powers.

To meet Mr. Arnott is to be convinced that he is, at at anyrate, sincere in his contention that he has power to locate mineral. He has made no endeavour to commercialize the peculiar power which he claims but on the other hand has paid all his own expenses while in the north and has absolutely refused remuneration for investigation which he has carried out on any properties.

A man absolutely unversed in mineralogy, and knowing practically nothing of the bush, Mr. Arnott has met with severe tests at the hands of prospectors and mining men, but has never failed to make good.

If such a thing as discovering hidden mineral bodies through the medium of a "divining rod" really exists it will revolutionize prospecting. Mr. Arnott intends to continue with his experiments next Spring. He has convinced himself that he has the power he claims and has also convinced a number of hard headed northerners that he is not a faker.

A great rule of science is to deny nothing until actual proof is forthcoming that what is claimed is rendered impossible through scientific investigations ,and the result of the work done on the property recently staked by Mr. Arnott is eagerly awaited as it will prove definitely whether or not the "divining rod" in his hands is really an object with superhuman powers or whether he is only one of the many who has fooled himself by believing himself capable of powers denied the ordinary human.

Northern Manitoba waits with considerable interest the final results of Mr. Arnott's experiments. The sceptical are willing to be convinced by actual proof and there are many people who are already confident that proof will be forthcoming that Mr. Arnott is what he claims to be.

MINING CONVENTION IN CHICAGO.

In one line of industrial effort, the United States has always ranked first—namely, the production of labor saving equipment machinery.

This is particularly true of mine equipment and mine machinery for our great natural resources and the enormous industrial demand in this country have made it possible to develop the use of machinery in a larger and more intensive basis than in any other country in the world. This is well illustrated in the development of our copper resources. Out in Utah a whole mountain of low grade copper are has been utilized effectively through the introduction of large scale machine processes and practically the entire mountain has been dug away through the use of strip mining such as is seen in the great iron ore fields of northern Minnesota. These developments are typical of American mine equipment machinery.

Naturally, therefore, American mine equipment and mine machinery is found in every section of the world where mining is an important factor. From the Lean gold fields in Siberia, where American dredges formerly sucked up the gold bearing sand, to South Africa and Australia, American mine machinery is a standard.

As a result the bringing together of over two hundred exhibits representing the latest forms of American mine equipment and mine machinery at the National exposition of Mines and Mining equipment at the Coliseum in Chicago, October 17-22, has attracted the international interest of every foreign country which furnishes possibilities for the development of its mineral resources.

In response to an invitation to be represented at this great convention and exposition, a number of foreign countries will be officially represented by delegates of technical men appointed to study and investigate machinery exhibits and the machinery processes which are being utilized in American mining enterprises. Among the countries which have already accepted this invitation to be officially represented are Belgium, Italy, Spain, Mexico, Cuba, Costa Rica, Nicaragua, Columbia, Venezuela, Ecuador, Chile, Argentine, Brazil, China, Denmark, Norway, Sweden.

At the present time every American business man is interested in seeing the development of additional outlets for the scale of American products abroad in order that we may maintain the full productive capacity of our industrial plants during the years to come. Undoubtedly one of the important outlets for our plant capacity will be through the development of the utilization of American capital in mining enterprises overseas, especially in those countries which are as yet undeveloped and which have large mineral resources. A good illustration of this is the recent purchase on the part of the United States Steel Corporation of a four million dollar acreage in Brazil which will be utilized for the production of manganese ore in large quantities. The investment of American capital abroad in mining enterprises in such countries as South and Central America, in China and later in Russia will afford a great opportunity for increasing the sale of American mine machinery and mine equipment in these countries thereby increasing the utilization of American industrial products and the sale of American products overseas.

The presence of these international delegates, therefore, at the National Exposition of Mines and Mining Equipment and the 24th Annual Convention of The American Mining Congress will add a feature of special interest.

The Canadian Mining Journal will be represented at the convention by a booth of which Mr. H. W. Thompson, our Western Manager, will be in charge.

LIBERTY BRAND FERRO-CERIUM.

To make one small piece of metal do the work of thousands of matches at considerably less cost and with far greater safety, is an achievement that may well be considered wonderful. Such is Liberty Brand Ferro Cerium, the "wonder metal," more commonly known as Sparking Metal, Pyrophoric Alloy, Cerium Iron, Flintstone and Firestone, which has the property of giving off spark-showers upon friction with a harder metal.

Years of exhaustive research and costly experiments by noted chemists and constant striving for improvements in manufacture, have made LIBERTY BRAND FERRO-CERIUM what it is today—The Highest Grade Sparking Metal Known. It is made of the best and purest materials obtainable and will not powder. At the same time it is so much lighter in weight that it gives you more pieces to the pound or kilo.

The "hotter" sparks of Liberty Brand Ferro Cerium and the close adherence of the spark shower to the metal is another feature that places it in a class by itself and makes it the most desirable sparking metal to use under all conditions.

For use in Miners' and other safety lamps a special Liberty Brand Ferro Cerium which yields a concentrated flame that closely adheres to the metal and does not throw off a distributed shower of sparks is made. In dangerous surroundings the advantages of this feature cannot be over-estimated. This special metal is produced exclusively by New Process Metals Corp., 46-50 Center Street, Newark, N.J., and is claimed to be the only metal approved officially by the United States Bureau of Mines.

New Process Metals Corporation invite correspondence from readers of the CANADIAN MINING JOURNAL and will gladly sent complete information to any one inquiring.

ANNUAL MEETING OF TORONTO ENGINEERING ALUMNI.

Elaborate preparations are under way for the third annual gathering of the University of Toronto School of Science men, which will be held in Toronto on the 4th and 5th of November. Arrangements, this year, are being made on a much larger scale than in previous years and it is expected that among the long list of distinguished guests will be one or two of International reputation. The Graduates are coming from all parts of Canada and the United States and it is expected that upwards of one thousand will attend the Reunion. The programme embraces the official opening of the new Science Building at the University—Dinner Dance at the King Edward—Numerous Class Reunion Luncheons—Queens vs. Varsity Rugby Game and winds up with one of the long famous "School" Dinners on Saturday night. At the Annual Meeting on Saturday morning, broad questions relative to University Policy, Technical Education and professional matters will be discussed.

Preliminary Report on Coal Statistics

For the Half-Year Ending June 30, 1921.

The Mining Branch of the Dominion Bureau of Statistics has compiled a preliminary report on coal statistics for the half-year ending June 30th of the calendar year. Comparative data regarding the output from Canadian mines are given by months for each Province, and for each kind of coal produced. Similar statistics covering the importations into Canada and the exports therefrom, have also been compiled. Throughout the tables a series of index numbers show the relation of the output, imports, or exports, as the case may be, for the year 1919 and the year 1921 in comparison with the base year of 1920 for which the value of 100 was taken in every instance.

The output of coal from Canadian mines during the first six months of this year declined to 80 per cent of the amount produced during the corresponding period last year but was 5 per cent in excess of the output for the same period during 1919. With the exception of New Brunswick, none of the provinces showed an output equal to the 1920 record. New Brunswick produced 10 per cent of its 1920 output and the other provinces follow in the order named: Saskatchewan, 94 per cent; British Columbia, 91 per cent; Nova Scotia, 87 per cent; Alberta, 79 per cent.

In the table given below, the output, shipments, and value of shipments of Canadian coal produced during the period have been tabulated. A part of the data included in the table has been estimated and the figures are therefore subject to revision. The total value of coal shipped during the period amounted to $32,882,953 and the average selling price reported from the different coal-producing areas ranged from $2.43 a ton for lignite coal in Saskatchewan to $8.53 a ton for anthracite in Alberta. The average for the Dominion was $5.75. The table follows:

Coal by Provinces and Grades for the Six Months Ending June 30, 1921.

Provinces	Output (tons)	Shipments (tons)	Total Value	Average Value per ton
Nova Scotia				
Bituminous	2,750,319	2,257,261	$14,536,760	$6.44
New Brunswick				
Bituminous	69 230	65,768	377,508	5.74
Saskatchewan				
Lignite	145,394	136,670	332,108	2.43
Alberta				
Anthracite	46,402	10,357	88,419	8 53
Bituminous	1,261,080	1,172,804	5,711,555	4.87
Lignite	1,125 312	979,021	4,405,594	4.50
Total for Alberta	2,432,794	2,162,182	$10,205,568	4.72
British Columbia				
Bituminous	1,385,323	1,094,405	7 431,009	6.79
Total for Canada	6,783 060	5,716,285	$32,882,953	$5.75

Having regard to importations, the data show that Canada as a whole imported 104 per cent of the amount of anthracite coal brought in during the same period in 1920, and 132 per cent of the bituminous. Quebec was the only province which imported less anthracite during the six months than in the same period, 1920, but even then, imported 96 per cent of the anthracite coal received in the half-year of 1920, an increase of 12 per cent over the figures for 1919. Manitoba and the Head of Lakes imported 169 per cent of the 1920 quota of anthracite; Nova Scotia, 140 per cent; New Brunswick, 128 per cent; Prince Edward Island, 108 per cent, and Central Ontario, 107 per cent. In every case these figures show that more anthracite was imported during the past six months than in the corresponding six months in 1919.

Bituminous coal entered at Fort William and Port Arthur and the Customs port of Manitoba, amounted to 235 per cent of the 1920 figures. Nova Scotia imported 224 per cent, as much bituminous as during the same period of the previous year but the entire quantity was only some 1,500 tons. Quebec was more fortunate in the matter of bituminons than in the previons year and during the first six months received 179 per cent of the amount which was brought in during the first six months of 1920. Central Ontario obtained 115 per cent as compared with importations in the first half of 1920.

Central Ontario has received during the first six months of the past three years a continually increasing amount of bituminous coal, the index numbers for the periods being 92 per cent in 1919; 100 in 1920 and 115 in 1921.

Exports of Canadian coal have declined from the base figure of 100 for six months ending June 30th to 68 for the same period during the present year. In 1919 the corresponding index number was 74. Total exports for the Dominion amounted to 869,004 tons this year as compared with 1,278,957 tons in the same period last year and 948,495 tons in the six months of 1919. British Columbia was the principal exporter during the period, the amount of coal shipped out of the province amounting to 517,823 tons during the period, representing 87 per cent of the amount exported from this province during the same time in 1920. Nova Scotia shipped, for foreign trade, only 48 per cent of the amount of coal exported during the six months in 1920. The actual tonnage of exports for the six months just closed amounted to 284,601 short tons. The total output of coal from the mines of Canada during the first six months of the present year amounted to 6,783,060 tons. During the first six months of 1920 the output was 7,929,269 tons and in the same period in 1919, 6,355,532 tons. Total importations of anthracite and bituminous coal during the half-year just closed amounted to 8,319,246 tons, as compared with 6,768,709 tons in 1920 and 6,723,757 tons in the preceding year. Export figures have already been given and from these data the coal supply of the Dominion may be determined. The output from Canadian mines plus the amount imported and less the quantities exported, leaves an amount which may be called the "Coal Supply." This figure for the six months of 1921 was 14,233,302 tons, as compared with 13,419,021 tons in 1920, and 12,130,794 tons in 1919.

It thus appears that the Canadian coal supply for the half-year as shown by the index numbers, rose from 90 in 1919 to 100 in 1920 and 106 in the half-year just closed.

TO GRIND FELDSPAR IN FRONTENAC COUNTY.

In order not to have to order ground feldspar from New York State, the Frontenac Floor & Wall Tile Co. is commencing the erection of a large grinding plant here. For years feldspar has been shipped from Frontenac county to American points to be ground and the product shipped back into Canada. It is expected that more grinding plants will be established near the mines throughout the county.

Northern Ontario Letter

THE SILVER MINES.

The Cobalt Field.

At the end of September, the quotations for silver continued to hold at above 70 cents an ounce, and the strong demand from the Far east appeared to indicate the likelihood of this price being maintained with good prospects of a still further advance. Silver-mining companies which operated last summer and made a profit with silver selling at below 60 cents per ounce are now realizing exeeedingly big profit. Other companies which have not made a start since closing last year, are now confronted with conditions under which they could again operate profitably. Labor is abundant and efficient, while heavy rains during the closing days of September asure ample hydro-electric power to operate the mines of Cobalt at full capacity. Added to this is a continued decline in the cost of supplies and a gradually broadening margin of net profit.

Nipissing.

Production from the Nipissing mine during September will be announced as usual about the 8th of the current month. It is understood the value produced during the period was the highest for any month during the current year. The new vein opened up in August stood up, well under the development work carried on during September, and this, together with the higher price of silver combined to increase the value of the output for the month.

La Rose Operating Four Mines.

Official advice from the La Rose Consolidated is exceptionally favorable. The company is now operating four mines, these being the original La Rose, Princess, University and Violet. Production has recently reached a rate of upwards of 500,000 ounces annually, and the total of the current year may approach that figure. In doing this, the four mines are sending out a total of about 130 tons of ore daily. Asked as to the outlook on the Violet property about which some very optimistic reports have been in circulation, Mr. G. C. Bateman, manager, told the Journal that a small amount of high grade is being bagged from the pay-streak, and that a large tonnage of good mill rock is being encountered. The silver values extend over a width of close to six feet and this is proving to be a source of big production. As a result of these favorable achievements on the La Rose, rumors are current which indicate the possibility of the company being able to resume dividend provided this record is maintained and the price of silver continues high.

May Reopen McKinley-Darragh.

The prospects of the McKinley-Darragh mine being reopened within a reasonably short time are considered to be bright. The matter, of course, rests with the directors to determine whether it would be best to start up now in the face of winter or await the arrival of spring when the resumption could be brought at considerably less expense. The disadvantage of waiting for spring is that considerable overhead expense is going on even during the idle period and this fact is encouraging the belief in Cobalt that the mine may actually be re-opened this fall. One favorable feature of the McKinley-Darragh is that upwards of 25,000 tons of ore is lying in the stopes, broken and ready to send to the mill. This could be turned into revenue quickly.

Temiskaming.

J. P. Bickell, president of the Temiskaming Mining Company states that the mine was forced to close last year only after the price of silver declined to below 70 cents an ounce. At that time, it is important to keep in mind, the cost of producing silver in Cobalt was about 20 p. c. higher than at the present time, so that it would appear as though the Temiskaming could now produce silver at a cost of under 60 cents per ounce. As against this, the metal is now commanding a price of over 70 cents an ounce, plus American exchange which brings the total up to between 77 and 80 cents per ounce in Canadian money. This offers good prospects of the Temiskaming being re-opened soon.

Kerr Lake.

During the fiscal year ended August 31st, the Kerr Lake Mining Company made a net profit of $478,979, an amount which is equal to 79 cents on each issued share. This compares with a net profit of $916,089 during the preceding year. The decline in earnings was due to curtailment of work on the company's property at Cobalt, as the greater part of the net profit came from newly acquired property in Utah. The higher price of silver during the past month encourages the belief that the current year may result in profitable operations being also resumed at Cobalt.

Premo Silver.

The installation of a small mining plant on the Premo Silver Cobalt property on the Montreal River near Latchford has commenced. Two boilers, a compressor and hoist comprise the new equipment. The property has seven veins showing, and former work consisted of surface trenching together with upwards of 100 feet of underground work divided between two shafts. The veins contain low silver values together with quite a large percentage of cobalt.

Searching for Cobalt Ores.

A feature of interest at this time in the Cobalt and surrounding district is the search for properties on which cobalt ore occurs. Cobalt, South Lorrain and Gowganda areas are being looked over with the object in view of carrying on work for cobalt, and to recover silver as a by-product. There are various properties on which the silver values proved to be too small to warrant operation, and it is now believed they could be worked profitably for cobalt.

Extending T. & N. O. Ry. to New Post.

An extension of the T. and N. O. Railway from Elk Lake to Gowganda is not expected for some time, according to unofficial information coming from North Bay following the conference there between E. C. Drury, premier of Ontario, and the Commissioners of the railway. The Commission will concentrate construction effort on the extension of the main line northward from Cochrane to a point near New Post on the Abitibi River. This is about 70 miles north of Cochrane and about 80 miles from tidewater on James Bay. Near New Post it will be possible to generate a minimum of 300,000 h.p., according to official information submitted to the Journal by Geo. W. Lee, Chairman of the T. and N. O. Railway Commission. This will comprise a number of developments, the main one of which will be a fall of 200 feet where over 200,000 h.p. may be developed. Press despatches have pointed out that the extension is to Smoky Falls, but such despatches are in error, Mr. Lee told the Journal, as the exact objectives is Tin Can Portage, at a point near New Post.

THE GOLD MINES.

Much Wanted Rain Falls In The Porcupine District.

Torrents of rain fell all along the height of land in this part of Northern Ontario during the closing week of September and rendered the outlook for hydro-electric power much more favorable. Upwards of four inches of rain fell during the week, two inches of which fell on the closing day of the month. This has raised the water in some of the streams from two to three feet and the storage basins are filling quite rapidly. As a result of this, the output of gold from the Porcupine field may be increased by several hundred thousand dollars and perhaps measured in millions as compared with what might have been the case had the weather continued dry.

The prospects of the Hollinger maintaining an income of around a million dollars a month unremittingly are greatly enhanced by this heavy rainfall. It may be pointed out that whereas the months of September and October of last year were the driest in sixty years, the exact opposite is proving to be the case this year, thereby offering every likelihood of each of the gold producing mines being able to go right through the winter at maximum capacity.

Last week, the McIntyre was bending much energy toward securing auxiliary equipment with which to generate power should the hydro-electric supply fail, and, now that wet weather has set in, coupled with the precautions taken to provide auxiliary equipment, no difficulty is anticipated in maintaining the current high rate of output. Moreover, it is believed the company may now proceed as rapidly as possible to carry out its big construction program in connection with doubling the capacity of its mill. It is believed this addition may be made and in operation by May of the coming year. A feature of the McIntyre is that accordingly as greater depth is attained, the ore becomes richer, the best ore so far found being at a depth of 1,750 feet, the deepest level so far reached on this property.

A force of upwards of 350 men comprises the crew at the Dome Mines, and the mill is treating an average of between 1,000 and 1,100 tons of ore daily. Mill heads are being maintained at around $7.50 per ton. This means that production averages around $7,500 daily at present, or at the rate of $2,737,500 annually. By adding the premium on United States funds, the gross income is indicated to be in the neighborhood of $3,000,000. Provided total costs do not exceed $4 per ton and thus leaving a net profit of $3.50 per ton, it follows that daily net profits of around $3,500 are being realized, or at the rate of $1,277,500 a year. This amounts to close to 27 p. c. on the company's issued capital. Further, given more time to increase tonnage to between 1,250 and 1,350 tons per day, it is believed the net profits may be brought up to over 30 p. c. annually. It is learned that developments at the 7th level are exceedingly favorable and that a large amount of ore has been opened up which contains an average of over $20 to the ton. The company will pay its usual quarterly dividend of 2½ p.c. Oct. 20th.

Thompsonite, the new explosive which is being manufactured in Deseronto is proving to be a success. A carload of the explosive was shipped to Porcupine two weeks ago, and, after being given a week's trial, the Dome Mine purchased the entire carload. A feature of the new powder is that in addition to having breaking power equal to the best on the market, the fumes after blasting do not contain gases, and it is possible for miners to return to the point of blasting within a few minutes after firing the charge.

This third diamond drill hole is under way on the Rochester property, lying north-west of the Hollinger. This work is being done by the Nipissing.

Kirkland Lake District.

A deal for the Townsite property in the Kirkland Lake district is pending. Certain interests in the United States are making a bid for the property.

The Kirkland Lake Proprietary (1919), Ltd., is meeting with encouraging results on its Tough-Oakes and Burnside properties. This is especially true of the Burnside where two important veins are being developed. It has just been learned that Mr. Latilla, of London, will sail from Liverpool on Oct. 10th for the purpose of visiting the property.

Some Miscellaneous Notes.

Enlargements to the mill on the Teck-Hughes are being carried forward at a good rate, and the plant is expected to be able to treat about 150 tons daily by the end of the current year.

The surface plan of exploration has been about completed on the King Kirkland Gold Mines and arrangements are now being made to carry on extensive underground operations. Toward this end, a large compressor has been placed on order.

Road work is progressing favorably on the extension of the Kirkland Lake highway through the township of Lebel. The greater part of this extension will be gravelled this fall and will be ready for rock during the coming summer.

A total of about 100 claims were staked in the rush to Luella Lake in the township of Rankin and Doon. About 50 have been recorded and further applications are expected at the recording office. The samples brought out are extremely rich, but the pay-streak is said to be very narrow. As yet, the average gold content of the dyke in which the pay-streak occurs has not been ascertained.

B.C. GOLD PRODUCTION.

Receipts of gold up to date at the Dominion Assay Office, Vancouver, indicate the gold production of British Columbia will be considerably greater for 1921 than that of 1920. The total receipts of bullion this year so far aggregate in value $1,275,000, as against $1,073,000 for the same period last year. The improvement, generally speaking, is ascribed first to the reopening of the local mines of the Consolidated Mining and Smelting Company of Canada Limited, and, second, to the fact that the placer mining areas are working under more satisfactory conditions, there being abundance of water, whereas last year there was a notable scarcity of that necessity.

BRITISH EMPIRE STEEL.

The time for exchanging 6 per cent. preference shares of the Dominion Steel Corporation, Ltd., 7 per cent. preferred stock of the Dominion Iron and Steel Co., Ltd., 7 per cent. preferred stock of Dominion Coal Co., Ltd., 8 per cent. preference shares of the Nova Scotia Steel and Coal Co., Ltd., 6 per cent. preference shares of the Eastern Car Co., Ltd., 7 per cent. preference stock of the Halifax Shipyards, Ltd., for cumulative 7 per cent. first preference Series B. stock of the British Empire Steel Corporation, Ltd., has been extended until Dec. 15, 1921.

British Columbia Letter

Stewart, B C.: The driving of two crosscuts on the property of the Bush Mines, Ltd., Salmon River, has served to open up a large body of ore. This work was done from Nos. 1 and 2 tunnels, and the results have proved the soundness of the reasoning of those in charge.—Development on the Idaho Group of Mineral Claims, Marmot River, has exposed a lead in respect of which the owners express every satisfaction.—The Luck Group, on Fish Creek, the property of Behnsen Brothers, of Victoria, B. C., is showing up most promisingly.

Alice Arm, B. C.: The Homestake Group, Kitsault River, under bond to the Consolidated Homestake Mining and Development Co., Ltd., of Vancouver, B. C., are being opened up with an energy indicative of a determination to make them productive with little delay. Three tunnels are being driven on these claims which, it is said with confidence, will prove up a considerable body of high grade silver-copper-gold ore. They already are in some distance and will be completed next summer. A site has been prepared for a compressor plant, which machinery, together with other equipment, will be shipped in as soon as the snow disappears. The intention is to instal it as soon as possible, using water power from a creek on the company's property for operation purposes. G. Hanson, of the Canadian Geological Survey, who has been working in the Kitsault section of Alice Arm District during the summer, is reported as saying that there are very large bodies of ore in the upper Kitsault Valley and that the camp has a great future.

Prince Rupert, B. C.: W. G. Fearnsides, a geologist of Sheffield, Eng., accompanied by John McLeish, of the Department of Mines, Ottawa, has been visiting Anyox and other mining centres of British Columbia. Mr. Fearnsides is engaged in research work throughout the United States and Canada. He has visited the asbestos mines of Thetford, Quebec, the nickel mines of Sudbury, and the iron mines at Missanabie. After inspecting the plant of the Granby Consolidated Mining & Smelting Co., that of the Consolidated Mining and Smelting Co. at Trail, and the collieries of the Crow's Nest Pass, he will tour California, Nevada and Arizona.

Trail, B. C.: Ore receipts in gross tons at the Trail Smelter of the Consolidated Mining & Smelting Co. aggregated 4,575 tons for the week ending September 21st. Of this 4471 tons came from the company's properties, 20 tons being received from the Champion, Salmo, and 84 from the Knob Hill, Republic, Wn.

The silver-lead mine operators of the Kootenay Districts of British Columbia have been addressed by the management of the Consolidated Mining & Smelting Co., Trail, B. C., explaining the conclusions reached at a recent conference between the company's representatives and those of the operators and asking for expressions of opinion, especially regarding the proposed formation of a lead pool in order to obtain the advantage of the higher prices that might be expected for deliveries against sales.

Appended are the important sections of the text of the company's circular:

Payments.

Gold.—95 per cent. at $20 per ounce. No pay for gold unless three one-hundredths of an ounce (.03 oz.) per dry ton or over.

Silver.—95 per cent. on the fire assay at the average Engineering and Mining Journal quotation for foreign silver for the calendar week, including the date of arrival, converted into Canadian funds at par. Minimum deduction from silver one-half (.5 oz.) ounce per dry ton.

Lead.—Contents to be determined by wet analysis, deducting one and one-half units to arrive at the dry lead assay.

Ninety per cent. of the lead will be accounted for on the said dry lead assay, provided, however, that in no case will the deduction from said dry lead assay be less than one unit or 20 pounds per dry ton of ore.

The price of lead to be used in settlement will be the London Metal Exchange spot quotation at the Bank of Montreal sale price for sterling exchange, less 1½c. per pound for refining and marketing. Both quotation and exchange rate used to be the average for the calendar week, including the date of arrival at Tadanac, B. C.

You will note that the schedule diminishing the quantity of silver and lead to be paid for with zinc over 10 per cent. is abolished.

Treatment rates as in Schedule "C" are unchanged except that the charge for zinc will be 50 cents instead of 60 cents.

Less for Exchange.

The allowanee for exchange based on the net value of gold and silver paid for will be the excess over 2 per cent. on the Bank of Montreal's purchase price for United States funds for the week including the date of arrival. This is in place of the excess over 5 per cent now allowed.

This proposal involves the fixing of the value of the ore at the time of its arrival at Tadanac, i.e., spot quotation.

Payment in full will be made in 90 days after the date of arrival. Drafts will be accepted for all or part of the value which doubtless could be negotiated without trouble at any bank. Interest during this period will be borne by the shipper.

The price for lead is low on account of the sale of large large quantities in keen competition in the Orient. The Canadian market is taking only a small quantity. The intention is to vary the lead payment from time to time to suit conditions. Stocks are very large at present which, added to poor markets, makes it necessary to defer payments. We hope to be able to reduce the time of payment as conditions become better.

A Possible Pool.

There was some discussion at the meeting as to the payment for lead, but we left the meeting with the understanding that the spot settlement was preferred. It has since been rather forcibly represented to us, from various quarters, that a scheme involving settlement for lead as delivered against sales was likely to result in higher prices for shippers and might be preferred; i.e., to pay shippers at the price we get f.o.b. Tadanac as we deliver against sales, our lead, including the present stock, being pooled with yours.

In view of an impression that we have that shippers were not satisfied with the operation of the previous lead pool, we do not feel justified in starting another in operation unless requested to do so.

We would figure on starting the pool (if requested) with stocks in our hands Oct. 1, 1921, which have not been delivered against sales; to add receipts from all sources and deduct deliveries against sales from month

to month until the stock at Oct. 1 was accounted for, then the receipts in the month of October, and so on. Each month's sales deliveries and each month's receipts would be treated as a unit. The net settlement price for each month's sales deliveries would be that obtained at point of delivery, less freight and other charges incurred in effecting such delivery and also less ¾ cent per pound for refining, i.e., the actual delivery charges and the refining charge would be substituted for the usual 1½ cent deduction.

In the vent of pooling the lead being preferred, no change would be made in any other part of the settlement, except that in valuing ore for drafts, 75 per cent. of the value of the lead at London price less 1½ per cent would be used instead of 100 per cent., as in the lead spot settlement.

Nelson, B. C.: One of the main features of Nelson's Annual Exhibition was a mineral display. An exhibit entered by J. W. Mulholland, well-known prospector, and now the operator of the Ivy Fern, Cultus Ck., included samples of ore from 163 distinct properties. There also was a contribution from the Consolidated Mining and Smelting Co., Trail, including a miniature lay-out of six lead tanks so equipped as to illustrate the electrolytical reducing process. There were specimens, too, of all the varied products of the Company's plant. In the competitive section the prospectors' discovery class brought out four exhibits, silver-lead ore from the W. J. Richards property in Anderson Ck.; gold ore from John Smallwood's Adora group on Bird Ck.; copper gold ore from the Vendla group at Greenwood; and high grade milling ore from the Ross property, Park Siding. The Anderson Ck. ore was awarded first place. Other awards follow: Gold ore—First, Robert Qua, for ore from Gold Plate, Apex; Silver ore—First, James Tiyo, for ore from Duck Creek claims; Copper Sulphide ore—J. W. Mulholland, for ore from the Iva Fern, Cultus Ck.; and Ore from a Shipping Mine—First, Vendla Mine, Greenwood.

Vancouver, B. C.: Litigation has commenced in the British Columbia Courts at Vancouver, B. C., the issue of which is ownership of the Engineer Mine, Atlin District, admittedly one of the richest lode gold properties of the Province, and for which over $1,000,000 has been offered on more than one occasion. The property consists of a group of six mineral claims situated on the east side of Taku Arm, Lake Tagish, near Atlin, on which considerable development has been done showing up a considerable body of ore. There also is a small stamp mill and other equipment. Action is being brought by the Engineer Mining Company and the Attorney General of the Province against J. A. Fraser, as administrator of the estate of the late Capt. James Alexander, who was lost on the S.S. Sophia, and also against the administrator of the Allan I. Smith estate, and against Charles C. Smith, Leda M. Smith, and Louisa Chapman Smith, heirs of the Smith estate. The latter are heirs and successors of the late Capt. Alexander, whose title is assailed. The history of the mine dates back to 1889, when the claims were located by two Swedes, Charles A. Anderson and Frank Nelson, representing the Aga Gold Mining Partnership. These afterwards were taken over by the Engineer Mining Company, an Alaska Company, with headquarters at Skagway. Crown grants subsequently were applied for, but were refused by the Gold Commissioner and Mining Recorder, doubtless on the ground that the provisions of the law had not been fully complied with. Meanwhile, it is alleged by the plaintiff, Alexander and his partners jumped the claims, re-staked, and eventually obtained Crown Grants. The Company asserts that it expended $40,000 on the development of the property. It admits that its free miners' license expired on the 31st May, 1917, but alleges it was not aware of this until 1918. It charges Alexander with making false affidavits when applying for title and alleges that he, in order to acquire the company's stamp mill and other machinery, arranged that judgment be obtained against the company in the County Court, Atlin. The company's mill, buildings and machinery were valued at $20,000, and were sold under process of execution to realize judgment of $452. The property was bought in by Alexander who, it is alleged, prevented competitive bidding at the sale by threat. The plaintiff company asks for a declaration that it is the owner of the mine, and that Alexander and his associates fraudulently, deceitfully, and unlawfully, obtained the Crown Grants.

Victoria, B. C.: Thomas Gibson, Deputy Minister of Mines for the Province of Ontario, while visiting British Columbia recently, observed that while the nickel and copper mining industries of Ontario were at present quiet, there was unusual activity in gold mining. Ontario, he said, was producing more gold than all the other provinces of Canada combined, and this year the value of the output would aggregate between thirteen and fourteen millions of dollars. The great Hollinger Mine in the Porcupine District is producing at the rate of about $8,000,000 for the year.

BEATTY VISITS TRAIL SMELTER.

E. W. Beatty, K. C., the first Canadian born president of the Canadian Pacific Railway, accompanied by Vice-President D. C. Coleman, F. W. Peters, general superintendent for British Columbia; C. A. Cotterill, assistant general superintendent; W. O. Miller, division superintendent; Senator F. L. Beique, of Quebec; Sir Augustus Nanton, head of the Canadian Advisory Board of the Hudson's Bay Company; General H. C. Nanton, and Sir Herbert Holt, president of the Royal Bank of Canada, visited the city yesterday and made a tour of inspection of the big plant on the hill. In the afternoon General Manager Blaylock, T. W. Bingay and B. A. Stimmel brought the party down to take in the sights of the big fair. President Beatty and his party were very much surprised at the high quality of the products of this section, voicing their astonishment in no uncertain manner.

JOBS FOR SENSIBLE WORKERS.

Laborers employed by the Oliver Iron Mining Co. accepted their third wage reduction Aug. 29. That brought the scale down to 30 cents an hour from the high point of 46 cents. Mine superintendents generally claim that the efficiency of labor has increased progressively during the last few months. Cost of production is being brought down substantially. J. H. McLean, general manager of the Oliver Iron Mining Co. states that every effort will be made by his company to afford employment to miners during the present difficult period.

Mr. Samuel W. Cohen has returned to Montreal after an examination of the Murray Claims, Elbow Lake, Northern Manitoba.

A MINE MODEL.

Showing Relation of Mine Workings to Keewatin Surface.

By JOHN W. SHAW.

At the Casey Cobalt Silver Mine near New Liskeard, Ont. the relative position of the various geological formations has an important bearing on the location of the ore bodies. The lowest formation is the Keewatin. The Huronian conglomerate overlays the Keewatin and these two formations are cut by a diabase intrusion which is of much later occurrence than the other formations.

It soon became evident that the pay ore in the veins extended from the Keewatin-conglomerate contact for a distance, seldom exceeding one hundred feet, into the conglomerate. It can, therefore, readily be seen that the location of this contact was of great importance as an aid in laying out exploration work at this mine. In order to get this information quickly over an extended area, numerous diamond drill holes were put down from the surface and from the underground workings to cut this contact. From the data thus obtained a contour map was made of the upper surface of the Keewatin formation. In order to show the relative position of this contact and the underground workings a model was made and it is the object of this article to describe the method of constructing this model in the hope that it may be of benefit to others working under similar conditions.

The model was made on a scale of 100' — 1" and represents an area of about 300 acres.

The contour map was placed on a large sheet of "Beaver board" and, by means of carbon paper, the lowest contour and the next twenty feet higher traced on the Beaver board. The board was then cut along the first contour and nailed to the table intended to hold the finished model. In the same way the second and third contours were traced on a second sheet of Beaver board, cut along the second contour and tacked on the first sheet over the second contour on that sheet. This procedure was continued until all the twenty feet contours had been placed in position. After each sheet was tacked in position it was given a coat of varnish to prevent shrinking. It is to be noted that Beaver board is 1/5" in thickness so that each sheet of board represents twenty feet on the scale used.

The spaces between the contours was then filled with "Plastizine" (a modeling clay). The mine workings on each level a height of ten feet and supported in their proper position on wires driven into the model. The shafts were made of wood and held in position by means of glue. Diamond drill holes were represented by wires stuck into the model in their proper position. The model mine workings, drill holes, etc. were painted to represent the various formations through which they pass.

President Chas. L. Denison states that a meeting of shareholders of Teck-Hughes Gold Mines, Ltd., will be called shortly to ratify a proposed reorganization of the company.

Mr. Thos. W. Gibson, Deputy Minister of Mines, Ontario, has been visiting mining districts in Western Canada.

NEW GOLD RUSH.

Claim-staking has become general among the prospectors who followed the back-trail of Benard Mic-Mac the Indian who recently came into Elk Lake and recorded a number of mining claims. The Indian endeavored to confuse those who followed him, but to no avail, and, anyhow, the records at the mining recorder's offiee showed the location of the find which lies at the north-east side of Luella Lake. In the meantime, the Indian had carelessly shown some samples to prospectors at Fort Matachewan and these men were staking claims adjaeent to the find even before Mic-Mac had reached the recording offiee.

A. E. Dumont who is said to be in the field for the M. J. O'Brien interests was the first to record claims following the recording of the Mic-Mac group. The Mic-Mac Indian recorded six claims. Dumont recorded eight, while Michell and Harry Baptiste recorded four. Up to Monday, a returning prospector declares 49 claims had been staked while others were being staked out as quickly as lines could be blazed and stakes made.

According to prospectors, the gold occurs in schist which shows very little quartz. The enrichment is said to occur in an outcrop of andesite and basalt formation which, starting at the north-easterly shore of Near Lake (sometimes known as Luella Lake) crosses the township line between Rankin and Doon townships and is about a mile wide from east to west and less than two miles in length from north to south. At least this much is shown on the geological map, and there is a possibility of the belt being much longer.

The mining recorder for the Elk Lake and Gowganda districts is absent on his holidays and the local office is in charge of Gladys Brooks, a girl deputy. Instead of business being slack, as has been the case for some months, the office has become one of the busiest places in the town and the new business is being well taken care of.

Up to the present, none of the Government geologists have had time to reach the scene of the new find, but a visit is expected during the next few days.

NIPISSING PRODUCTION.

During the month of August the Nipissing mine produced an average of $5,378.60 every twenty-four hours, thereby setting the highest record so far during the current year. In his regular monthly report to the president and directors, Hugh Park, Manager, states that during the month, the company mined ore of an estimated net value of $172,931 and shipped bullion from Nipissing and customs ores of an estimated net value of $236,558. The value of the silver production was estimated at 63 cents per ounce. Encouraging results were obtained at the second level of the 63 shaft at the end of the month. A vein was found which has a width of from two to three inches and assays several thousand ounces to the ton. This may prove to be a continuation of a small vein found some time ago about 250 feet distant, at which point developments were indifferent. General work at other shafts was usually encouraging. The low grade mill treated 7,325 tons of ore. The high grade plant treated 66 tons. Some changes for improved treatment were made in this plant which temporarily reduced tonnage treated. The refinery shipped 381,504 fine ounces of bullion. The following is an estimate of net production for the month of August: —

Silver	$147,551
Cobalt	25,380
Total	$172,931

The outstanding feature of the report as above presented is the announeement relative to the new high grade discovery which is the first to be made for some months.

TORONTO MINING QUOTATIONS.

Quotations on Active Stocks on Standard Stock Exchange on 4th October 1921.

	High.	Low.	Last.
Adanac Silver Mines, Ltd.	1½	1⅛	1⅛
Bailey	3	3	3
Beaver Consolidated	28	26½	27
Crown Reserve	15	11	15
Gifford	⅝	½	⅝
La Rose	33	32	32
McKin.-Dar.-Savage	23	19	23
Mining Corp. of Can.	1.15	1.10	1.15
Nipissing	5.80	5.60	6.70
Ophir	1⅜	1¼	1⅝
Peterson Lake	6¾	5½	6½
Temiskaming	27	25	27
Trethewey	131½	111½	131½
Gold.			
Atlas	18½	16	18½
Dome Lake	7⅛	6¼	6½
Dome Mines	22.00	20.00	21.00
Gold Reef	2¼	2¼	2¼
Hollinger Cons.	7.50	7.43	7.45
Inspiration	2¼	2¼	2¼
Keora	10	8¾	9¼
Kirkland Lake	38	35½	36¾
Lake Shore M. Ltd.	1.36	1.34	1.34
McIntre	1.98	1.92	1.98
Moneta	12	12	12
Newray Mines, Ltd	5½	4¾	5½
Porcupine Crown	16½	14½	16½
Porcupine Imperial	½	½	½
Porcupine V.N.T.	19½	18¾	18¾
Preston East Dome	2⅞	2⅝	2⅝
Schumaeher	26½	24	25½
So. Keora	50	24	45
Teck-Hughes	16½	15½	15½
West Dome	7¼	6¾	7
West Tree Mines Ltd.	4⅞	4	4⅞
Wasapika Gold M. Ltd.	5	4¼	4¼
Miscellaneous.			
Petrol Oil	21	20	20
Vacuum G.	4½	4½	4½

METAL QUOTATIONS.

Following are the fair average prices for ingot metals (in less than car-loads):

Toronto	Cents per lb. 5th Oct. (Unchanged since last week)
Copper, Electric	17
Copper, Casting	16¾
Tin	35
Lead	6¾
Zinc	7½
Aluminum	27
Antimony	9

The Canadian Miners' Buying Directory.

Acetylene Gas:
Canada Carbide Company, Ltd.
Prest-O-Lite Co. of Canada, Ltd.

Acetylene Welding:
The Toronto Iron Works, Ltd.

A.C. Units:
Powley & Townsley, Limited.

Agitators:
The Dorr Co
Can. Chicago Bridge & Iron Co., Ltd.
Horton Steel Works, Limited.

Air Compressors:
Belliss & Morcom, Ltd.
Laurie & Lamb

Air Hoists:
Canadian Ingersoll Rand Co., Ltd
Mussens, Limited.

Air Receivers:
The Toronto Iron Works, Ltd.

Alloy and Carbon Tool Steel:
Peacock Brothers Limited.

Alternators:
MacGovern & Co.

Aluminium:
Spielman Agencies, Regd.

Amalgamators:
Northern Canada Supply Co.
Mine and Smelter Supply Co.
Wabi Iron Works.

Antimony:
Canada Metal Co.

Antimonial Lead:
Pennsylvania Smelting Co.

Assayers' and Chemists' Supplies:
Dominion Engineering & Inspection Co
Lymans, Limited
Mine & Smelter Supply Co.
Pennsylvania Smelting Co.
Stanley, W. F. & Co., Ltd.

Ash Conveyors:
Canadian Link-Belt Company

Ashes Handling Machinery:
Canadian Link-Belt Co., Ltd.

Assayers and Chemists:
Milton L. Hersey Co., Ltd.
Campbell & Deyell
Ledoux & Co.
Thos. Heys & Son
C. L. Constant Co.

Asbestos:
Everitt & Co.

Balls:
Hull Iron & Steel Foundries, Ltd.
Peacock Brothers Limited.
The Wabi Iron Works.
The Hardinge Conical Mill Co.
The William Kennedy & Sons, Ltd.

Ball Mills:
Hardinge Conical Mill Co.
Hull Iron & Steel Foundries, Ltd.
The Wabi Iron Works.
The William Kennedy & Sons, Ltd.

Babbit Metals:
Canada Metal Co.
Hoyt Metal Co.

Ball Mill Feeders:
Hardinge Conical Mill Co.
Hull Iron & Steel Foundries, Ltd.

Ball Mill Linings:
Hardinge Conical Mill Co.
The William Kennedy & Sons, Ltd.
Peacock Brothers, Limited
Hull Iron & Steel Foundries, Ltd.

Belting—Leather, Rubber and Cotton:
Canadian Link-Belt Co., Ltd.
The Mine & Smelter Supply Co.
Northern Canada Supply Co.
Jones & Glasco.

Belting:
R. T. Gilman & Co.
Gutta Percha & Rubber, Ltd.

Belting—Silent Chain:
Canadian Link-Belt Co., Ltd.
Hans Renold of Canada, Limited, Montreal
Jones & Glassco (Regd.)

Belting (Transmission):
Goodyear Tire & Rubber Co.

Belting (Elevator):
Goodyear Tire & Rubber Co.

Belting (Conveyor):
Goodyear Tire & Rubber Co.
Gutta Percha & Rubber, Ltd.

Bins and Hoppers:
The Toronto Iron Works, Ltd.
Can. Chicago Bridge & Iron Co., Ltd.
Horton Steel Works, Limited.

Blasting Batteries and Supplies:
Canadian Ingersoll-Rand Co., Ltd
Mussens, Ltd.
Canadian Explosives, Ltd.
Powley & Townsley, Limited.

Bluestone:
The Consolidated Mining & Smelting Co
The Conlagas Reduction Co., Ltd.

Blowers:
Canadian Fairbanks-Morse Co., Ltd
Northern Canada Supply Co.

Boilers:
Canadian Ingersoll-Rand Co., Ltd
Marsh Engineering Works
R. T. Gilman & Co.
The John Inglis Company
Wabi Iron Works.

Blue Vitriol (Conlagas Reg):
Canadian Fairbanks-Morse Co., Ltd.

Bortz and Carbons:
Diamond Drill Carbon Co.

Boxes, Cable Junction:
Standard Underground Cable Co. of Canada, Ltd.
Northern Electric Co., Ltd.

Brazilian Rough Diamonds:
Diamond Drill Carbon Co.

Brazilian Mica:
Diamond Drill Carbon Co.

Buggies, Mine Car (Steel)
Hendrick Manufacturing Co

Brazilian Ballas:
Diamond Drill Carbon Co.

Brazilian Rock Crystal:
Diamond Drill Carbon Co.

Brazilian Tourmalines:
Diamond Drill Carbon Co.

Brazilian Aquamarines:
Diamond Drill Carbon Co.

Bridges—Man Trolley and Rope Operated—Material Handling:
Canadian Mead-Morrison Co., Limited

Bronze, Manganese, Perforated and Plain:
Hendrick Manufacturing Co.

Buckets:
Canadian Ingersoll-Rand Co., Ltd.
R. T. Gilman & Co.
Hendrick Manufacturing Co.
Canadian Link-Belt Co., Ltd.
Marsh Engineering Works
Mussens, Ltd.
MacKinnon Steel Co., Ltd.
Northern Canada Supply Co.
The Wabi Iron Works

Buckets, Elevator:
Canadian Link-Belt Co., Ltd.
Hendrick Mfg. Co.
Peacock Brothers Limited.

Cable—Aerial and Underground:
Canada Wire & Cable Co.
Northern Canada Supply Co.
Standard Underground Cable Co. of Canada, Ltd
Peacock Brothers, Limited

Cableways:
Canadian Mead-Morrison Co., Limited
Fraser & Chalmers of Canada, Ltd.
Mussens, Ltd.
The Wabi Iron Works
R. T. Gilman & Co.

Cages:
Canadian Ingersoll-Rand Co., Ltd., Montreal, Que
Northern Canada Supply Co.
Fraser & Chalmers of Canada, Ltd.
The Electric Steel & Metals Co.
The Mine & Smelter Supply Co.
Mussens, Ltd.
The Wabi Iron Works

GOLD PRODUCTION OF YUKON.

The gold yield of the Yukon valley, including Canadian and American territory, for the season 1921 aggregates approximately $4,000,000. It is estimated that the production of the interior of Alaska for the season will run to about $2,675,000. The output of the Canadian Yukon will amount to $1,250,000 for the season. A million of this was produced within a radius of fifty miles of Dawson and the bulk was shipped from that point. This makes a total for the two territories of $3,925,000, to which may be added an estimated $75,000 for the Atlin Camp, which is in Northern British Columbia on lakes which drain into the head waters of the Yukon River.

Following is the total season's yield, as estimated, by camps: Dawson, $1,250,000; Fairbanks, $800,000; Kuskokwill, $550,000; Iditarod, $500,000; Tolovana, $250,000; Ruby, $125,000; Bettles, $85,000; Ophir, $80,000; Marshall, $50,000; Circle, $50,000; Chandelar, $40,000; Hot Springs, $35,000; Rampart, $25,000; Eagle, $35,000; Forty Mile, $40,000; Atlin, $75,000.

Hydraulic operations around Dawson are shutting down, the first frosts forcing the cleanup. Several dredges around Dawson will run two or three months longer. These include two new dredges on Dominion Creek, one on Gold Run, and two on Klondyke Valley. A dredge on Highet Creek, tributary to Dawson, is also having an exceptionally successful season. The Old Glacier Creek District west of Dawson, which was struck before the Klondyke, is producing over $100,000 this year by the old steam thaw and hoisting processes alone.

Mr. John McLeish of the Mines Department, Ottawa, is visiting mining districts in British Columbia.

EDITORIAL

RESEARCH AND ITS APPLICATION TO INDUSTRY.

In addressing the Western meeting of the Canadian Institute of Mining and Metallurgy in Edmonton, Dr. H. M. Tory, President of the University of Alberta, made reference to the fact that many of the important discoveries in natural science have been made by workers who considered only in a minor way, if at all, the commercial value of the results of their research.

It is well known that the most thorough investigations are carried on by men who are chiefly interested in science because of their desire to know. It does not necessarily follow, however, that research that is undertaken regardless of commercial results is more praiseworthy than research carried on with a definite commercial object in view. Nor does it follow that men should be urged to ignore the commercial aspect of research. It is true that many men have failed to profit from the results of their research, and it is likely that many others will have to find their reward in the knowledge of the fact that they have helped in unraveling another secret of nature. Halos for research are cheap in this world, and there are some people who incline to the opinion that a liberal stock of halos is kept on hand by those who turn to their own profit the results obtained by researchers.

We incline to the view that the application of science is quite as important as the truths unearthed by study. In fairness to the researcher, it must be said that he makes gratuitous contributions to his fellows; but he who applies the discovery may make just as important a contribution, and he must also see to it that the commercial results are worth while. Our thanks are due to those who discover truths, but no less are they due to those who demonstrate how knowledge of those truths can be made to serve us profitably.

In claiming that the application of science to industry is quite as important to our welfare as the discovery of nature's truths, we do not wish to detract from the praise that is due research workers who regard the commercial value of their work as of little moment. We wish, rather, to point out that their researches will be of greater credit to them if they do not entirely lose sight of the real object of research—not the search for truth alone, but the search for truth for the benefit of man. It is true that all truths are useful; but it is also true that their usefulness has sometimes remained hidden for days and years, because the researcher had the fault for which there is a tendency in some quarters to praise him—lack of a developed commercial sense.

Dr. Tory states that the primary motive behind research is not commercial, but is "the spirit of man demanding knowledge and going out to find it." He claims that the "best intellects" have never endeavored to make money out of their discoveries. Now there can be little doubt that the researcher, when in the midst of his work, is most likely to get results if he concentrates his attention on his problem. We do not agree, however, that the intellect of the researcher is degraded if he, having made a discovery, endeavors to make useful application of that discovery. Moreover, the ability of the researcher to work is not lessened by his having an idea, when tackling a problem, of the possible commercial value of the solution of the problem. We do not wish to deprecate the value of the investigations that are carried on with the sole object of gaining information; but we are convinced that such researches are not more laudable than researches carried on with a view to gaining information for a definite purpose. There can be no doubt that many discoveries have been made by workers who did not appreciate the value of their discovery, and who worked simply with a desire to learn the facts. They deserve much praise for their contributions to knowledge; but it is as well to remember that if others had not turned their discoveries to the service of mankind there would seldom be occasion to remember the discoverer.

All research is valuable, and those who work solely with the view to gain knowledge will always be honored. All the praise that Dr. Tory gives such workers is due them. We, nevertheless, incline to the view that the application of science to industry is quite as important as the unveiling of nature's secrets. Further, we believe that the desired closer contact between colleges and industry will be brought about by mutual understanding of the work of both parties. Those who wish industry to be more sympathetic with the views of the researcher, will do well to rid themselves of the idea that science is degraded when it is turned to service.

In this connection we may refer to the proposed establishment of bureaus of industrial research. To us it seems that such bureaus must, sooner or later, be established in this country. In our opinion, the value of such bureaus will be determined very largely by the endeavor made to learn facts with definite objects in view. The researcher will inevitably follow many byways in seeking his goal and he may well be allowed to explore those byways; but he should not be allowed to spend too much time on these byways and should be reminded that there is a known value to the goal he started for. If the researcher has no other interest than to explore, he is not likely reach the goal. He may, in his explorations, make valuable discoveries, and the value of these will not be lessened by the fact that they are likely to help him in reaching his goal when he returns to the main object of his search. But aimless wandering with no advance towards a definite object is not the type of research that industry wants. Those who are in charge of bureaus of research must be familiar with the problems of industry and point the way, so that the work of the researcher will be along lines that are likely to lead to results that are commercially valuable. If the "best intellects" cannot work along these lines, industry will have to use ordinary mortals in its research bureaus as it does in its other departments.

THE THREATENED RAILWAY STRIKE.

The dispute over wages is developing rapidly towards a crisis in the United States. The railroad workers are naturally unwilling to accept reductions and they threaten to strike. In view of the industrial situation in the United States it is not likely that the railroad workers are anxious to join the ranks of the unemployed. It is also probable that, if they do, they will get little sympathy from the workers in industries which will be adversely affected by a strike.

It is certain that the railroad rates are too high for business and that the wages paid make it difficult to reduce the rates. To many it will appear that the announcement of a cut in railroad workers' wages is a belated recognition of the inevitable. There will not be a great deal of public sympathy for those who insist on having wages that make business impossible. It is to be hoped that a strike will be avoided, for it will help further to handicap many struggling industries. From the reports which reach us, however, it seems not unlikely that the railroad workers are determined to use a weapon which is most powerful, but often dangerous to the user and to spectators of the battle.

THE SEARCH FOR OIL.

There has not yet been announced any spectacular discovery of oil in the Mackenzie River area this summer. The difficulty of exploring areas where transportation is such a large part of the problem make progress slow, and there is now concensus of opinion that it will be some time yet before the value of the discovery made at Fort Norman last year will be known. There is noticeable a better appreciation of the distance of Fort Norman from the railways, and a tendency to turn from distant fields to others that are more easily reached.

The Fort Norman discovery attracted much attention because of its great significance. It served as a reminder that our unexplored areas may become the scenes of great industrial activity when their secrets are learned. Whether or not a productive oil field is found and developed in the Fort Norman area, the discovery made last summer will mark an important point in the history of the development of the Mackenzie River region.

During the past summer many have visited the scene of the discovery. Many others have gone into the district and explored small portions of the great territory tributary to the Mackenzie. Some have written accounts of their trips, and our daily and weekly newspapers have published, this year, many interesting descriptions of voyage to Fort Norman. The district has become of real interest to a great many people. Its development will, as a result, come much more quickly because of the oil discovery. Interest will lag because of the apparent scarcity of results obtained this summer, but realization of the difficulties will lead to postponement of judgment for some time yet. We may expect that areas more easily accessible will soon begin to show results of exploration of oil; but apparently the possibilities of the Fort Norman field cannot be safely guessed at this year.

Government officials, recently returned from the Mackenzie River area, are reported to be of the opinion that it will take at least another year to determine the importance of the Fort Norman field. Even then, the oil resources of the far north will be almost unknown, for it will take many years to prospect the area that is regarded as favorable for oil.

Henry Ford is introducing new ideas in paying workers at his Michigan iron mine. He pays surface workers at the same rate as miners.

EDITORIAL NOTES.

Commenting on the McFadden bill, a contributor to "Mining and Scientific Press" remarks that "special privilege legislation such as this is never desirable as a political policy." He contends that passage of the bill would temporarily stimulate, but not build build up the industry. One might suggest the possibility of getting a new prescription after the stimulant has done its work; but we are inclined to agree with the general view of the contributor, if not with his particular statement, that the present depression is largely the result of recovery from special privilege laws.

It is expected in Sydney that a large tonnage of steel rails will shortly be ordered for the Canadian National Railways. If such an order is obtained by the Nova Scotia steel manufacturers it will materially improve industrial prospects in Cape Breton. At present, there is a dearth of orders for steel and this makes the coal mining industry's outlook none too bright.

Commenting on the rise in the price of silver, "Engineering and Mining Journal" remarks that there has been no notable accumulation and that it has naturally been one of the first metals to respond to better feeling. Of the future course our New York contemporary predicts that there may be a slight reaction following the spurt upward, but not a permanent one.

Lead is reported to be in good market position, stocks being low and prices firm with a tendency upward.

According to opinions expressed by several mining engineers in the "Mining and Scientific Press" there has been no notable increase in gold mining in the United States recently, except at Cripple Creek. The improvement in conditions has evidently not been as great as in Ontario's gold mining districts.

NICKEL IN ORE FROM B. C. MINES.

Victoria, B.C.: George E. Winkler, president and manager of the Gabbro Copper Mines Ltd., west coast of Vancouver Island, reports the discovery of nickel in the ores of that property. In a zone recently uncovered, having a maximum width of over 30 feet, there was shown considerable copper and a great deal of pyrrhotite. Unlike occurrences in the Smloch Mine, situated in the near vicinity, where what is known as the Cave Zone is in the basalt, several hundred feet from the gabbro contact, the newly found one of the Gabbro Mine is entirely in the gazbbro. A pyrrhotite sample was selected for the purpose of assay for nickel. It was assayed at the Provincial Bureau of Mines and gave a return of 5 per cent nickel. Check assays gave similar results. Specimens have been sent to the Canadian Geological Survey Branch, Ottawa, where they have created much interest.

THE CONSUMPTION OF EXPLOSIVES.

The mining industry is by far the largest consumer of explosives according to the United States Bureau of Mines. The quantity thus used is generally about 75 per cent of the total production of all classes of explosives.

Coal mining normally consumes between 80 and 85 per cent of all black powder and permissible explosives used in the United States, and between 8 an 16 per cent of other high explosives. Other mining and quarrying operations consume from 40 to 50 per cent of all high high explosives other than permissibles, 6 to 17 per cent of permissible explosives, and 3 to 4 per cent of black powder.

In 1920 the sales of permissible explosives, which are those tested by the U. S. Bureau of Mines in an atmosphere containing inflammable gas and coal dust and found to be reasonably safe for use under such conditions, reached a record-breaking figure. The quantity reported was 53,962,841 pounds, an increase of more than 15 million pounds, or 39 per cent, as compared with 1919, and nearly double the sales reported for 1915. For every thousand tons of coal produced, the relative amount of permissibles used, as compared with other explosives, has more than doubled since 1912. In 1902 only 11,300 pounds of these short-flame or "safety" explosives were used in coal mining.

The quantity of permissible explosives used in the United States is larger than that of the corresponding explosives used in a number of foreign countries. In 1912 it represented about 5 per cent of the total quantity of explosives produced in that country, and in 1920 it was 10.03 per cent. The total amount of explosives used for the production of coal in 1920 was 302,258,010 pounds, of which 15 per cent was of the permissible class.

Accidents due to the use of explosives during the past nine years, have caused from 4 to 9 per cent. of all fatalities at coal mines, 9 to 14 per cent at metal mines, and 13 to 26 per cent at quarries. Considered in relation to the number of men employed, there has been a general decline in the number of such fatalities, although the rate has fluctuated from year to year. From 37 to 61 per cent of the fatalities in the United States occurred at the anthracite mines in Pennsylvania.

BRITISH MINE OWNERS WIN.

The labor troubles in the South Wales coal field, which arose over the interpretation of the terms of settlement of the recent coal strike, have been settled in favor of the mine owners, according to the award made by Sir William Plender, who had been selected to arbitrate the differences between the miners and the owners. The Mines Department of the Government had contended that the liability of the mine owners for September wages was 97.57 on the 1915 standard. The owners claimed that the liability should be 76.6. The Mines Department had maintained that the owners should contribute ten shillings per ton, amounting in all to £750,000, toward wages. The owners claimed that this sum should be provided through the Government subsidy of £10,000,000. At a meeting in Cardiff on September 26 the mine owners decided to close a large number of the collieries. On October 3 the mine owners agreed to refer the dispute to an Arbitration Board. The award of the arbitrator is expected to result in reopening of numerous collieries, thus easing the unemployment situation.

The Search for Oil in the Pasquai Hills

By Reece H. Hague.

Having recently returned from a visit to the Pasquai Hills, a district in which the search for oil has caused considerable discussion of recent months, the writer feels it may be of interest to outline the situation existing there.

For many years the presence in the Pasquai Hills of tremendous bodies of shale carrying an oil content has been known, and from time to time in the past prospectors have visited the district and staked claims, only to find when attempting to record them, that the land, being part of a Dominion Forest Reserve, was not open to be leased.

The Imperial Oil Company had representatives in the district in 1913 but suspended operation shortly after the outbreak of war.

When, in November last, the Pasquai Hills was thrown open for staking there was a rush of men, anxious to secure oil leases, to the locality and many thousands of acres were staked. Several syndicates were formed, some of them with the intention of boring for oil and others bent on extracting oil from the shales. S. C. Ells, a Dominion Government shale expert, spent several weeks going over the district carefully and securing samples for analysis. His report on the district has not yet been issued; but should throw considerable light on the subject when published.

Of the various organizations formed for the purposes of carrying on the search for oil in the Pasquai Hills, the one which has made most headway and is deserving of most credit is the North Battleford Oil and Gas syndicate, a group of Saskatchewan men who contributed a sum of money towards conducting investigations in the district and refrained from stock selling. A Star Drill was purchased in the United States and arrangements made for its transportation to the Pasquai Hills. The Syndicate had much to contend against. Many people sneered at the possibility of an oil field occurring in the Pasquai Hills district and the syndicate received little encouragement or help in the early stages of their work.

As is always the case of pioneers in any industry they found that the task they had undertaken was a difficult and expensive one and it has cost them in the vicinity of $40,000 to get their rig to the spot chosen for drilling, the parts assembled and a start made in the drilling.

It was necessary to transport all their plant 120 miles by water from The Pass to an unloading point on the Carrot River, a stream which is shallow in places and in low water offers difficulty in the matter of navigation on account of rapids. After unloading their material from the boat there was still an 18 mile journey through the bush to be undertaken before reaching the drilling site on the banks of the Man River. A lumber company tote road extended for 5 miles of the distance but the other 13 miles of road had to be cut through a dense bush. The going on the completed road was very heavy in places, the sticky black mud frequently reaching over the axles of the waggons, and the horses being able to pull only light loads on each crossing.

Eventually all the necessary equipment was taken to the Man River. Oil drillers were secured from the United States at a big expense and everything in readiness for the spudding in of the first well, which took place on October 3.

The writer accompanied G. B. MacMillan, field manager for the syndicate, on a journey to the Pasquai Hill to witness the spudding in. The well was officially christened the "Battle No. 1" and the hope that it would be a gusher expressed.

The drillers are favorably impressed with the formation of the country in the vicinity of the drill and consider the chances of striking a well good.

The drill is erected about 200 yards from the Man River on what Mr. MacMillan claims is the only true anticline he has seen in the district. Immediately across the river from the drill site is a towering exposure of shale. While sinking for water for the boiler, a few feet from the drill, heavy shale giving forth a strong smell of gasoline was encountered at a depth of six feet.

It is believed that this body of shale will extend for some 150 feet and that it will not be necessary to use casing in the whole for that distance. A large supply of casing has been secured to be used when necessary, the largest size being 12¼ inches and that with which it is intended to finish the hole 7¾ inches.

Only one tower is being worked at present, but it is the intention of the syndicate to get more drillers and start to operate a second tower almost immediately. When both towers are working the combined shifts should cover 40 feet a day unless some unforseen obstacles are encountered. A hole eight feet deep was dug before drilling was commenced in order to pass through a narrow boulder strip which would have impeded work in the initial stages. The syndicate have agreed to supply the Director of the Boring Division, Geological Department, Ottawa, with the log of the well and samples taken every few feet in the sinking.

Mr. MacMillan is confident that if oil is not encountered gas will be, as the presence of gas in the district has long been known and one prospector, after sinking a hole thirty feet with hand augers, had his tools blown into the air by an escape of gas, which rendered the atmosphere so bad that he was unable to return to the scene of his operations for some time.

The peculiar rumbling which is noticeable in the Pasquai Hill is attributed by some people to the presence of gas. The Indians who live in the foothills have a superstition that it is the growling of the spirits of the bears, which they maintain reside in the mountains and create an uproar when angry. The Indians have other superstitions regarding the Pasquai Hills and few of them will venture into the region, which they say is "Bad medicine."

Seepages have been encountered in the locality and it was noticeable on the trip to and from the Man River that the water in some of the streams left a thick scum of oil on the drinking utensils, when boiled.

Traces of Mr Ells' work were seen in the Hills. In one place he made a deep excavation into the side of an 80 foot exposure of shale occurring on the bank of the Man River. While working in the locality Mr. Ells uncovered the fossilized remains of what was at first thought to be a dinosaurus but which has later stated to be a conglomeration of bones of animals dat-

ing from the very ancient to the comparatively modern times.

The Man River at the spot where the Syndicate are drilling is 400 feet higher than The Pas and some 80 miles distant in a direct line, and in the event of oil being encountered it could be taken to the latter point by a pipe line.

Near the drill site is an ideal holding basin for oil, which could be used pending the construction of tanks. It is the intention of the drillers to cap the well temporarily in the event of indications pointing to oil or gas being near, in order that the necessary arrangements for controlling the flow can be made.

The cost of drilling is estimated at $6.50 a foot and with the other heavy expenses which the Syndicate will have to bear it will cost them a considerable sum of money to bore a well of any great depth. After the freeze up it will be necessary to transport supplies and any necessary equipment from The Pas into the Man River by horse teams, a distance of 120 miles.

Early Prospecting.

Probably the first prospector for oil in the Pasquai Hills was a German by the name of Brunne who lived in the district for many years, but never divulged what he had discovered. His secrecy gained for him the reputation of being an employee of the German Government, which it was stated he supplied with traeings of the district. However these rumours were probably unfounded as no proof of them is forthcoming.

Brunne died in 1911 and a tracing showing a staking in the Pasquai Hills was subsequently found in his old grub box. The location was rather vague, but a party of men who were taking up leasage in the Pasquai Hills recently found a stake bearing Brunne's name and showing that it was his Number One post on a staking made June 10, 1908.

The writer visited Brunne's old cabin situated not far from the Syndicate camp on the Man River. The cabin has fallen badly into repair and tools such as augers which were found in it have been eached near by.

Several American oil operators have visited the Pasquai Hills district recently and there is a probability that one or two more rigs will be installed in the Man River locality at an early date.

Some Leasers' Difficulties.

The Dominion Oil Regulations, as they stand at present, offer little inducement to development and there is a strong feeling locally that steps should be taken to have them amended. Then again it is a matter of months after an application has been put into Ottawa for acreage before the lease is granted and for some reason companies applying for shale rights have been unable to secure same.

Forest rangers keep a jealous guard of the timber in the district and a permit is required and charge made to cut even standing dead wood.

A charge of 50c an acre is made for land staked and it is necessary to stake for the Crown a tract of similar size to that applied for. Many applications for ground have been in Ottawa accompanied by the fee for months and no word of the leases has been received by the applicants.

Naturally in a district such as the Pasquai Hills there has been some confusion as regards applications, as the territory is unsurveyed and there is occasionally a paucity of detail as to exact location and a certain amount of overlapping of claims to be considered. The delay in receiving leases applies, however, to claims the titles to which are perfectly clear.

There is a general feeling existing among oil men who have visited the Pasquai Hills that in the event of indications being born out by drilling the Pasquai Hills will be the next big oil field on the continent. In any event there is general satisfaction expressed at the fact that one syndicate at least is going ahead and spending money in the district in a legitimate development enterprise and the results of their investigations are being eagerly watched in many quarters.

Providing work is carried on continuously, the next two months should tell the tale and in the event of the North Battleford Oil and Gas Syndicate's venture proving successful they will be well repaid for their expensive and arduous pioneering work. Residents of the district are viewing the matter sanely. While considerable staking has taken place in the district there has been no mad rush or undue excitement. People are sitting back waiting for results, but ready, as soon as any definite news leaks out, to hike with all haste in to the Pasquai Hills and get their share of land before outsiders can secure it all.

KERR LAKE MINES, LTD.

Mr. Adolph Levisohn, president of Kerr Lake Mines, Ltd., in his report to shareholders, says of operations for the year ending Aug. 31, 1921:

On account of the decline in the price of silver, operations were curtailed last December, though development work has been carried on continuously. The shipments for the year amounted to 282,075 gross ounces of silver. The smelter settlements aggregated 242,008 ounce, the difference being accounted for by the deductions made by the smelting works for losses and in the way of treatment charges.

During the early part of 1921 an opportunity presented itself to acquire the Hargrave property consisting of 80 acres (adjoining the Kerr Lake Mine) at a very favorable price. The ore taken from this property has already returned the purchase price and our engineers are hopeful that additional ore will be located so that the company may earn a substantial profit on this investment.

The Tahoe silver mine, in which this company has a majority interest, has been in continuous operation and has produced, since this company acquired its interest, a total of 983,007 ounces of silver and 1,868 ounces of gold. Certain unanticipated mining and metallurgical difficulties have been encountered which have prevented the making of as large a profit as hoped, but despite these the property has operated at a profit and the initial difficulties are, from present indications, gradually being overcome. Due to the fact that the oil engines have been superseded by electric power transmitted directly to the mine by a public power company, it is hoped that the mine will be able to operate more successfully during the coming winter. Development work at depth is being pushed.

During the year work has been continuously carried on in the construction of a 10 cu. ft. dredge on the property of the Rimu Gold Dredging Company in New Zealand, which is also controlled by this company. This dredge has recently been completed and a cable has just been received from the manager stating that the dredge began operations on September 12th, 1921.

Origin of the Explosion at Coal Creek

By J. J. ASHWORTH.

Second Report on the explosion which occurred in the Crows Nest Pass Coal Cos. No. 3 coal mine at Coal Creek, Fernie, B.C., on the 5th April 1917.

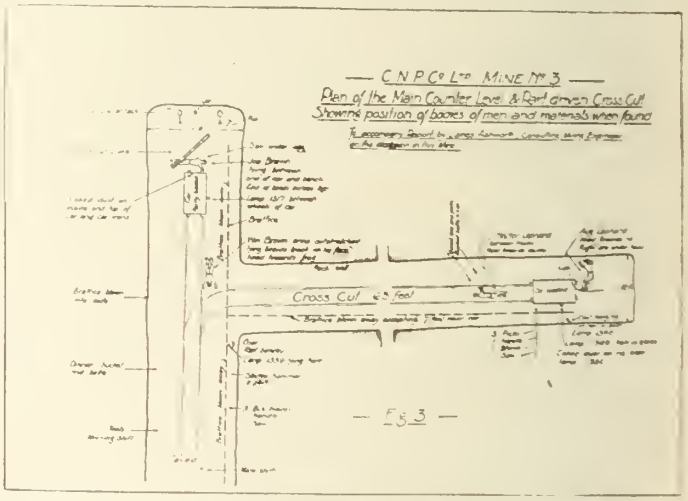
The first report on the Coal Creek explosion was made by the writer to the British Columbia Minister of Mines, the Hon. William Sloan, immediately after the inquest held by Mr. Murray on the bodies viewed by himself and the Jury, and as it was agreed by everybody who was interested in the exportation of the mine and the recovery of the remaining bodies, that as a consequence of the enormous damage done to the roadways and workings it was impossible to recover the remaining bodies for at least six months, the inquest was brought to a conclusion, without any evidence being produced as to the origin and cause of the explosion. It was, however, understood that if the Coroner thought it necessary after the recovery of the remainder of the bodies of the men killed, he would reopen the inquest.

Shortly afterwards one body was recovered, which proved to be that of a man who had been wrongly identified and the inquest was reopened, but, after the last of the bodies had been recovered, the further reopening of the inquest has not been permitted, and thus no verdict has been rendered by the jury as to the cause, the place of origin or whether or not any one was blamable for the deaths of 34 men.

The Minister of Mines' Report for 1918 does, however, give us a second Report from the Chief Inspector of Mines on that disaster, in which he explains why he concluded that the explosion was caused by a miner named August Leonard, whom, he thought, had punctured the glass of safety lamp No. 1349, and thus rendered it unsafe. If this had been correct, the miner would have broken one of the most important rules for safeguarding the colliery from such a disaster. Now what is the Inspector's argument? (page 347). First he assumes that August Leonard was *carrying* lamp No. 1349, but of this there is no proof whatever, nor that he was carrying a pick and other tools. Then he states: "Apparently, in passing through the narrow space between the car and the brattice, the glass of the lamp carried by August Leonard got punctured by coming in contact with some sharp instrument, presumably the point of a pick." The Chief Inspector goes on to say: "It is my opinion that this is the point or origin of the explosion, and what took place is about as follows: August Leonard was in the act of carrying back his tools. Having too many he probably stumbled, and one of the pick-points struck and penetrated the glass. It would seem probable Leonard heard the pick strike the glass, dropped his tools and raised his lamp to see what damage was done, raising it high enough to reach an accumulation of explosive gas along the roof of the place, so igniting the same, thereby causing the primary explosion."

Some extremely unlikely suppositions are grouped together in this theory. First, as to the tools; these were 2 pick POINTS,—one pick and handle, one shovel, and one saw,—hence it is clear that either the pick points or the pick MUST have been in an unexplained position to make it possible to be near the safety lamp glass, and it is also evident that nothing but a very sharp and hard blow could break a PUNCTURED hole through a safety lamp glass. Further than that, August Leonard was the whole length of the car away from the tools named, and, as showing that he was not near the tools when the explosion occurred, his cap was found close to his body behind the car. The Chief Inspector goes on to surmise that the blow from the pick point did *not* extinguish the flame in the lamp, and as a matter of fact, if those had been the conditions, then the explosion would have followed without giving him time to look at his lamp. To further back up this theory, we are asked to assume that the other lamp No. 1350 was not alight. We are also asked to assume (and are willing to do so), that there was a dusty atmosphere containing 4 per cent of explosive gas.

The Chief Inspector of Mines report does not favour us with the name or names of the originators of this theory of the puncturing of the lamp glass and no



Plan of main counter level showing position of bodies of men when found.

other theory is suggested than that August Leonard who was not found near the lamp was the culprit. Further there was absolutely nothing to provide a suggestion that the other lamp was already extinguished, seeing that it was provided with the ordinary Wolf relighter. It certainly does not seem reasonable to suppose that the miner would be trying to relight a damaged lamp when a safe lamp was already "in the dark".

The date and time of the recovery of August Leonard's safety lamp is not stated, but, as a matter of fact, the lamp was found covered with debris when the place was being cleaned up after the recovery of the bodies, and therefore there is a more than strong supposition that the lamp was punctured inadvertently by the pick of the man who found it. The puncture was a fortuitous happening, and was in itself a convenient circumstance on which to base a theory which was not borne out by any surrounding circumstance or evidence.

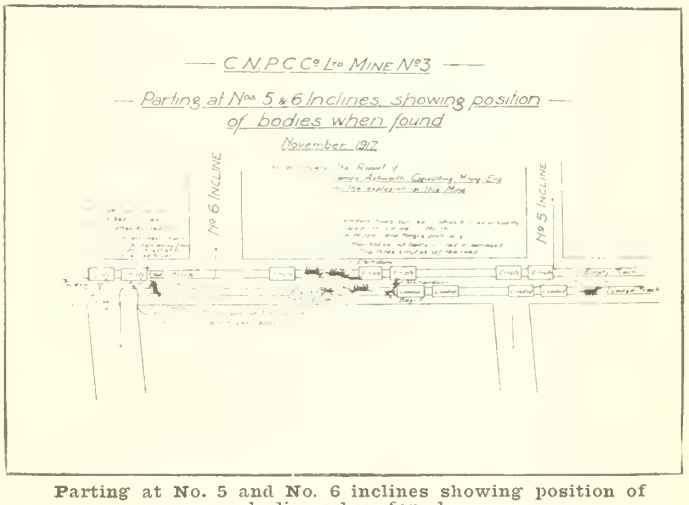
Was the miner to blame for working in dangerous

places under such conditions, or who was to blame? There was nothing in the then British Columbian Act of Parliament or in the Special Rules stating what percentage of gas constituted a dangerous condition of the ventilating current, but it does state that it must be "safe" for working and passing therein. This point was considered when the writer made his report on the explosion which occurred at the Reserve Mine at Nanaimo, and he then suggested that the rule used in British mines should be adopted, and so each fireboss would then understand that a quarter inch cap was the danger point. Small folding cards showing the appearance of the danger cap had been in the hands of officials long before the Reserve mine explosion, and were first issued in Sir Richard McBride's day.

Outside the question of the cause of the explosion, we have here a serious breach of British justice, viz., the condemnation of a miner for all this loss of life, without any semblance of a trial either by the coroner or by any special commission. There are other facts which, if considered in this connection, support the above arguments, and absolve August Leonard from the suggestion that his carelessness was the cause of this great disaster. Thus if we turn to the indications of force in the main level at bottom of Nos. 5 and 6 inclines and carefully examine these, we find that the Chief Inspector of Mines has had to adopt an impossible theory on which to build up his arguments as to the direction of forces, viz., that a heavy body of matter will be thrown further and more easily than a lighter body, that is to say, that where a horse is standing with its head pointing north and with a train of empty cars behind it, and a great blast of air rushes past in the direction south to north, the horse, although protected from the direct force by the cars, will be thrown out of the shafts, leaving its collar behind and the cars also. He then assumes that the horse driver is thrown into the place where the horse had been, — but whether by the same force or a secondary one he does not explain. Neither does he attempt to explain why the horse's collar, the safety lamp (in 2 parts), and the wood work of the tops of the cars, and probably the driver also, were thrown in the opposite direction to which he assumes the horse was thrown. The evident fallacy of this reasoning is so clear that it entirely absolves August Leonard as a culprit without other evidence which does so more completely.

The writer will now leave the Chief Inspector's theory for a time, and proceed to disclose his own theory based on all the indications disclosed during the cleaning up of the mine so far as it has gone.

Thus, at the time of the coroner's inquest it was evident to those who saw the inside of the mine, that the force of the explosion had come down Nos. 5 and 6 inclines, and possibly from the main level also. The evidence called attention to the various levels which were being driven to the south out of No. 6 incline, because out of No. 2, two miners left their work a considerable time before the proper quitting time. One of these men, Giacomazzi, had a brother working in No. 1 level, and as no one could suggest to the writer any reason why he and his partner should have come out before the end of the shift, he has always thought it was worth while to try and find out why they had quit. Unfortunately, these two men were killed when almost out of the mine, though one of them was still alive and lived three hours after being found by the first explorers. So far, information supplied to the writer has omitted the smallest mention of No. 1 level out of No. 6 incline, but it was established when the two bodies were recovered, under dangerous conditions, that both Nos. 1 and 2 levels were extra badly blocked by fallen roof, and that the indications of force were from No. 1 level direct into the incline, upwards also into No. 2, and thence into the incline, and so on upwards, and also across into No. 5 incline and again upwards to the top end and downwards into the main level. In the main level, the indications were most distinctly outbye from No. 5 incline, and thence also into the counter level. The roof falls inbye from No. 5 were so heavy that the direction of force could not be accurately diagnosed. However, since the cleaning up of the main level it has been ascertained that there were several horse drivers, with cars and horses, at this point, all of whom were evidently killed without any warning whatever, in fact so instantaneous was the death of one of them that he was found with his mouth wide open, as at the Reserve mine explosion, where there was a similar case, it may be safely assumed that the point of origin was pretty close at hand. On the inbye side of No. 6 incline there was a horse, its driver and some cars, and the main indications of force were inbye and across



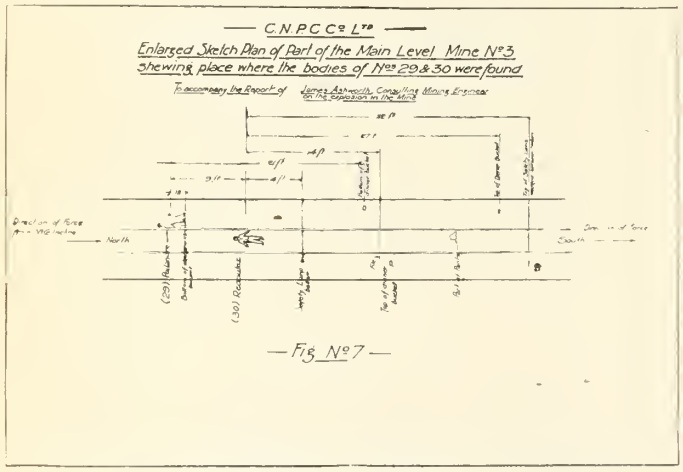
Parting at No. 5 and No. 6 inclines showing position of bodies when found.

the level, — the horses collar and gear having been torn off and found inbye of the horse, whilst the shafts remained attached to the cars and as these were empty they were wrecked and blown further inbye. The driver also with the driving lines still in his hands and his body burned and clothes ripped off was found between the shafts. The driver's safety lamp was smashed, the bottom part being on the roadway near the first car, and the rest part on the bottom of the remains of the second car. As usual, the wooden tops of these empty cars were smashed up, whilst the loaded ones remained intact.

With regard to the indications of force at this point the Chief Inspector could not make them fit his theory as to the point of origin without assuming that there were two forces, with an interval of time between to account for the position of the horse, viz., that an outward force, say from August Leonard's place, blew the horse out of the shafts outbye and that, later, the driver was forced into the place where the horse had been, seemingly forgetting that the lighter articles are always blown the furthest and that thus, the man, the cars, horse, collar and lamp top were carried furthest inbye. The position of the horse clearly showed that the force which threw it into the position where found

was a diagonal one which then passed through the cross cut on the lower side into the counter level and also inbye on the main level at the same time. It then became a race as to which force would first reach the end of the counter and main level, and possibly, as the air in the counter contained the most explosive mixture this force reached the men the first. Thus the heat effect would be more prolonged because there was not only flame heat, but also that due to compression which would operate until the force of the explosion had expended itself, and the condensation stage had set in. There was, however, further proof of the correctness of this argument in the main level, where two miners who had been driving it were found 500 feet outbye of the face, practically stripped of all their clothing, one safety lamp bottom being found on the high side of the level, a little inside of one of them, while the top part with the gauses near by, was found 28 feet further *inbye*, — the same with the men's dinner cans, the tops were further *inbye* than the bottoms or heavier parts. Nothing could be more conclusive evidence of the inbye direction of force than these positive facts.

Now, to return to the face of the counter, and the part driven cross cut, here there was phenomenal caking or coking of dust which could not have occurred if either



Plan of part of main level showing place where bodies were found.

of these places had been the point of origin, as, in that case, the heat would have been much less, and the force which was clearly in evidence would have been absent.

There is one more point in regard to the lamp No. 1349 of which the writer has only seen a photograph, which when the lamp is taken to pieces may prove whether or not it had passed a flame from the inside and thus ignited gas.

Again, on returning to the bottom of No. 6 incline and proceeding out by the damage done to the cars, men and horses is so slight in comparison with that done inbye that a reason has to be sought and that is quickly discovered on reaching the bottom of No. 5 incline. Here we find unmistakable evidence that the force and flame of the explosion also came down this incline, as in No. 6, and crossing the level into the counter than passed on oubbye on both the main level and the country.

Thus the siding, where most of the horse drivers were found was placed between two opposite forces, and in this way became a heated area under great compression and consequently the mechanical damage was very small. At least one horse was found in its shafts with the harness complete, and the body of the man which was found with mouth wide open where he was standing before the explosion, was not thrown about, but he was the worst burnt in this group and had most of his cloth ripped off. Thus the indications of force in this area become the most convincing evidence that it came down both Nos. 5 and 6 inclines, and that its point of origin must be looked for in that direction. We can, however, at once expunge No. 5 incline from further examination, because there were no working places out of it where the explosion could have originated. But in No. 6 incline there were several working places, of which any one may have been in a condition to originate an explosion. In fact in its normal condition the air coming down this incline seems to have carried at least two per cent of gas with much fine coal dust resulting from the passage of horses and cars. Broken lamps were found, thus No. 1375 was found with the glass broken, hanging up at the face of a crosscut. It had coked dust and small coal driven into the shield. Part of lamp No. 1388 was also found in No. 5 level. Why, then, should not either of these lamps or the miners using them be adjudged guilty of causing the explosion? Moreover, lamp No. 1375 was found in a condition much similar to that of August Leonard's, but the direction of force was from this cross cut downwards only as far as the next cross cut, where it turned north and not to the main level to the point from which the course of the explosion has already been definitely traced. It is not suggested, therefore, that this might have been the point of origin. The bodies of the two men found in this partly driven cross cut were, however, badly burned and a sample of coal dust taken from the next cross cut below showed the effect of great heat, as its analysis proved, viz., Moisture 1.3, Volatile matter 11.4, Fixed carbon 61.4, and Ash 25.9. Proceeding downwards in the direction of the ventilating air current, but in the opposite direction to the indications of the force of the explosion, we come to No. 3 South level, where in a cross cut between it and No. 2 South level a sample of coal dust was taken, which on analysis showed strong coking, viz., Moisture 1.2, Volatile matter 14.4, Fixed carbon 70.7 and Ash 13.7. Another sample of coal dust taken in No. 6 incline opposite No. 2 South level gave a similer analysis, viz., Moisture 0.8, Volatile matter 16.4, Fixed carbon 66.8, and Ash 16.0.

It has previously been shown that the indications of forces at the bottom of No. 6 incline demonstrated that it came DOWN the incline, and thence along the main level and counter in a southerly direction, and simultaneously with the force which came down No. 5 incline and which took a northerly direction to the old workings and the outside of the mine. Thus we have reached the point where the evidence demonstrates most distinctly that the point of origin of the force of the explosion must lie between Nos. 3, 2 and 1 levels. — In No. 3 two men were at the face; in No. 2 the men, Benezeth and J. Giacomazzi, had left their working place before quitting time, and their bodies were found in the main slope as previously described. In a cross cut out of No. 1 level B. Giacomazzi and Falip were at work, and though their bodies were recovered, their safety lamps were not recovered, and, so far as the writer has been informed, Nos. 1 and 2 levels have not been cleaned up nor carefully examined for information

which might disclose the cause of this disaster. After carefully considering the points already noted, the writer has come to the conclusion that the most probable point of origin is to be found in No. 1 level and cross cut, and he has assumed that B. Giacomazzi and his partner No. 2 level had some good and sufficient reason to cause them to hurry out of the mine.

The time when the disaster occurred, viz. at the end of the shift is very suggestive of blasting, the coal being hard in the crosscut, and although it has been definitely stated that no blasting was allowed, yet similar instances are on record. Thus, after an explosion in South Wales, Prof. Dr. William Galloway was left by the other experts solely by himself with the opinion that the cause of the explosion was a shot. However, he has lived to find out, years afterwards, that his conclusion was correct.

The writer would be loth to assert that a shot was the cause of the explosion at Coal Creek No. 3 mine, but, all the same, the indications of the direction of force point most distinctly to No. 1 level out of No. 6 incline as being the point of origin. Over four years have now elapsed since the disaster, but it may not yet be too late to discover the cause, which at the time of the explosion was attributed by the management to alien devilry.

Since the foregoing notes were written the B. C. Department of Mines in the spring of 1920, granted the writer's frequent request that the two missing safety lamps used by Giacomazzi and Falip, in No. 1 level out of No. 6 incline of No. 3 mine Coal Creek, should be recovered. These lamps had been left inside the mine at the time the bodies were recovered, at which time Giacomazzi's body was found lying on his back close to the high side rib, and his feet in the shearing,—Falip's body being also close by in the centre of the room, face downwards and with his face touching the coal. His clothes were badly torn. The lamps were found on about the first day of May 1920, in the proximity of where the bodies had lain, Falip's lamp being fifteen inches and Giacomazzi's thirteen inches from the coal face.

The latter's lamp had part of the shield and the glass broken, a portion of each being missing, the glass was smokey and the bottom gauze filled with coked coal dust. Fallip's lamp was practically intact, but had received a blow on the side of the shield causing it to press on the gauze. The glass was smoky and the lower gauze coated with coked coal dust.

These indications prove that the force came inwards and that it had not originated at the face of the level where the bodies of the men were found. With regard to this point, the ex-Chief Inspector of Mines (Mr. Wilkinson), in his first report, notes on page 507 (1917), that these two miners were not in their working place where the coal was hard, whereas at the face of the level the coal was soft. He says, that there were no signs of coking, but large deposits of soot and dust, also that the men were driving a cross cut to No. 2 room or level. Two other cross cuts had been previously driven from No. 1 to No. 2 level, and the indications showed that the line of force was inwards from the incline, and up the cross cut into No. 2 level or room.

These facts, when grouped together, and considered alongside with those disclosed at the foot of Nos. 6 and 5 inclines, and inbye also where the bodies of Philandre and Redoulez were found, show distinctly and in regular sequence that the origin of the explosion was in No. 6 incline district. In Nos. 5 and 6 inclines the force indicated a downward direction from, say, No. 2 level, and also an upward force from the same point, which again proves that the point of origin was in either No. 1 or No. 2 level, or in a cross cut between the two, and as Giacomazzi and Falip were the only miners at work in this area it would seem only necessary to find out which was their working place to completely unravel the mystery.

WORLD'S COAL PRODUCTION.

The world's production of coal during the first six months of 1921, according to reports collected by the United States Geological Survey, was approximately 525,300,000 metric tons. This was at an annual rate of 1,050,000,000 tons, a decrease of 250,000,000 tons when compared with the year 1920, and much below the output in any year of the preceding decade. The largest factors in this decrease were the British miners' strike, which lasted from April to June, and the world-wide industrial depression. The reaction has been in striking contrast to the feverish demand of 1920. Prices have collapsed, and seaborne coal trade has fallen off, affecting profoundly the volume of business offered to the world's shipping.

It is clear that the output during the second half of the year will be larger than in the first half because of the resumption of work at British collieries early in July. Even so there is little hope that the total for the year will much exceed 1,100,000,000 tons. Should that prove to be the case the world's production will have dropped back to the level of 1909. There is perhaps no more striking evidence of the state of prostration of world trade and industry than this fact. The relapse to 1909 levels is even more significant when it is remembered that the world's consumption of coal normally increases by leaps and bounds. The average rate of increase in the 20-year period preceding August, 1914, was 38,000,000 tons a year.

Of the principal coal-producing nations, Germany made perhaps the best showing in the first half of 1921. Production of bituminous coal in all districts, including Upper Silesia and the Saar Basin, was at the rate of 141,000,000 tons per year, far short of pre-war performance, but the output of lignite showed an increase over 1913 amounting to almost 30,000,000 tons a year. Whereas in 1913 the German Empire supplied only 22 per cent of the world's production of coal and lignite, its contribution in the first half of 1921 was 25 per cent of the whole and this in spite of the return of Alsace-Lorraine to France.

The proportion contributed by the United States was 42.2 per cent, a larger share than in pre-war days, but a smaller share than in any year since 1916.

LAWSON TO KIRKLAND LAKE.

According to the Toronto Mail and Empire, Thomas Lawson, famous instigator and follower of metal share booms, is stated to be coming to this camp to examine three groups of claims that have lately been negotiated, into a solid block. The block lies to the west of the producing area, and adjoins Kirkland Lake Gold and Elliott-Kirkland. It is composed of the properties of Chaput Hughes, Grozelle, and United-Kirkland. The block has good prospective merit. A million dollar deal was on for them once before last Spring, but failed for want of one vending signature.

METAL MINING ON VANCOUVER ISLAND.

On Vancouver Island there is very little of active metal mining in progress at present. The low copper quotations no doubt are largely, if not wholly, responsible. This does not mean, however, that there is a condition of complete stagnation. The foundations are being laid for large future developments. In this the Canadian Consolidated Mining & Smelting Co. Ltd., whose expansive and modern smelting plant situated at Trail gives them a commanding position in the Kootenays in respect of mining, will take a leading part. As is well-known this Corporation has an important property in the "Old Sport," near Quatsino Sound, on which thousands of dollars has been spent in exploration and other preliminary work with, according to report, very satisfactory results. It also has control of the "Sunloch," Jordan River, not far from Victoria. The "Sunloch" is an exceedingly promising prospect, in fact it is beyond the "prospect" stage now, with a large body of proven ore, and at a point where a steady output can be started and maintained as soon as the market is right. The same Corporation, being related through the Canadian Pacific Railway Co. with the Esquimalt & Nanaimo Ry. Co., is much interested in the minerals of the Esquimalt & Nanaimo R. Belt, Vancouver Island. At present, although work on the properties instanced and others has ceased, the Corporation's engineers are busily engaged in reconnaissance work in different sections of the Island. They are thoroughly combing the Quatsino District with a view to establishing what other mineral prospects are worthy of attention. They also are at work in the Cowichan River zone, the region of Nanaimo, and in the vicinity of Campbell River in the systematic assembly of such material as will facilitate the opening of good mineral bearing bodies. The desire, it is clear, is to definitely establish a source of supply, as permanent and dependable as possible, of good quality ore. This accomplished the next step—and this is reported on good authority—will be the installation of a smelter either somewhere on the Island or the Lower Mainland of British Columbia for the handling of the ore from Company Coast Properties and from such independent operators as may be shipping. There is no doubt that this is coming. How soon, is another question. But the Consolidated of Trail has its eye on the Costs and its expansion in this section is likely follow the same lines as has marked its progress in the Interior. There has been much criticism by the independent operators of the Kootenays at different times of the methods of the Corporation. It is not the purpose here to discuss the merits of these strictures. Doubtless similar aminadversions would have been directed any Monopoly, for that, without question, is what it has become. But it is equally certain that its place in the Kootenays has been won through the display of superlative enterprise and a spirit of progressiveness both technically and financially that has kept it well to the forefront of the smelter industries of the American continent. It is worth noting, too, in passing, that the present management has recently given evidence of a sincere desire to reach a better understanding with the Operators of the mining districts of the interior of the Province, which must have a very beneficial effect on the industry as a whole. All this is convincing evidence that the day the Canadian Consolidated Mining & Smelting Co. begins active operations in a big way on the Coast will be a Red Letter Day in the history of the mining industry of that part of British Columbia.

There is one mining property on Vancouver Island that has been showing up well of late, namely, the "You," the old McLeod group, a free milling gold proposition, situated on Ptarmigan Mountain, 2,700 feet above sea level, and fifteen miles from the mouth of Bedwell River, Clayoquot Sound. The owner, W. Woodworth, had driven an adit 78 feet on a quartz vein which Wm. M. Brewer, the resident mining engineer, describes as narrow but persistent. The walls are well defined. A ball mill is being installed, capable of handling one ton of ore a day. Mr. Woodworth states that it is his intention to sort the ore, treating only that yielding at the rate of $100 to the ton.

OBITUARY.

Stuart M. Thorne.

Major Stuart M. Thorne passed away on October 3rd after a lingering illness at the home of his uncle, Mr. A. E. Osler, in Toronto. Death was caused by a heart malady brought on by exposure while on active service as an officer in the Canadian Engineers.

He was forty-one years of age, a graduate of Toronto University in mining and engineering, and well known in Northern Ontario where he had been connected since 1908 with several mining enterprises and where he was highly esteemed for his sound judgment on mines and for the careful management he gave to the properties that were entrusted to him. Among the properties that were managed by him might be mentioned the Silver Leaf, Preston East Dome and the Trethewey.

In 1915 he resigned from the management of the Trethewey company and went overseas as lieutenant in the First Tunnelling Company. While in command of a section of this Company operating at St. Eloi in the Ypres salient, he had the distinction to have prepared the largest of the nineteen mines that were sprung at the Battle of Messines on the 7th of June, 1917, and won both the Military Cross and the Croix de Guerre. After his Tunnelling Company was merged with new battalions of Engineers, he served with distinction during the hard fighting of the summer and autumn of 1918 in command of "D" Company of the Fifth Battalion.

In 1919 he returned to Canada and resumed the practice of his profession, but his health had been permanently impaired, and last May he had to give up all professional work.

His loss is mourned by a large circle of friends and brother officers by whom he was affectionately regarded for his sterling character and bluff, hearty good-fellowship.

PERSONALS.

Mr. M. W. Summerhayes, who has been recently in California, is in Toronto. Mr. Summerhayes was for some time manager of the Porcupine Crown gold mine at Timmins.

C. J. F. Galloway, a mining engineer who has examined and reported upon coal areas of British Columbia, having left the Canadian West at the outbreak of the war, writes that he is on his way back from Sarawak, Borneo, where he has been engaged for the past four months in the examination of coal fields. He is en route to England.

GOLD WEALTH OF NORTHERN ONTARIO.

An Interesting Outside View of this District's Great Possibilities.

Barron's weekly publishes the following:

Northern Ontario possesses one of the greatest and most diversified mineral belts in the world. So far as yet proved—and it must be remembered that much of the ground to the extreme north is practically unknown land—the region of mineralization extends over several thousand square miles north of the Canadian Pacific Railroad and about 200 miles north of Toronto. The Temiskaming and Northern Ontario Railway runs through from North Bay to Cochrane, so that nowadays it is a comparatively simple matter to serve new mining camps as soon as developments justify. The territory contains the Sudbury nickel deposits from which 80 p.c. of the world's nickel requirements are obtained, and the Cobalt silver field which, in 16 years, has produced 10 p.c. of the world's silver output.

Unusual interest attaches to this region of Canada at the present time because of its gold producing possibilities. The world, outside of the United States, has greater need for gold at the present time than at any other period of history.

On the Eve of a Boom?

Gold mines, "prospects," fields and shares are attracting increasing attention. This movement may quite possibly in the near future assume the dimensions of a boom, proportionate in size to the severity of the preceding depression of gold. The world's output of gold since 1914 has fallen from about 21,000,000 ounces to 17,000,000 ounces and every gold producing country has contributed to that decline excepting Canada, which is now producing $16,000,000 per annum against $5,5000,000 in 1914. During practically the whole of that period conditions adverse for development ruled. Labor was in short supply and very expensive, while capital, the essential need of all new mining fields, found full occupation in other directions.

The Advent of British Capital.

To date it is safe to say that 75 per cent of the outside capital invested in Ontario mines has come from America, and only a very small proportion from Britain. This is partly attributable to the geographical situation and partly to the fact that British mining investors have been so exclusively responsible for the opening up of the great Rand gold field as well as the Indian, Australian and West African mines. These investments, however, appear to have passed the zenith of their revenue producing power and consequently, recognizing the immediately good future prospects of gold mines, British capital is now paying more attention to Canada, and the Porcupine field.

The Big Trio at Porcupine.

In that field there are at present only three large producing mines—the Dome, Hollinger and McIntyre—but they are all showing rich results in their lowest workings and appear to have brilliant prospects. The formation on which they work is known to extend for at least 12 miles on the strike and is believed to run a much greater distance. This formation, which is of peculiar character locally termed a "shear zone" measures 100 feet to 2,000 feet wide and contains numerous quartz veins of good body and proved persistency.

On the Hollinger there are over 200 veins which have been opened up by 35 miles of underground workings. The mine has ore reserves of over 3,000,000 tons blocked out above 850 feet, while levels down to 1,200 feet and boreholes down to 2,000 feet have proved continuance of highly satisfactory vein values and widths in depth. Costs on all the producing mines are low on account of wide ore bodies, hard yet friable ore, country rock of a character which needs practically no support, proximity to railway, and hydro-electric power supply available by contract at a price of about $60 per H.P. per annum. Shortage of power has been experienced at various times, however, and the Hollinger Co. is now scheming to utilize a big fall on the Abitibi River. The grade of ore mined by the three mines averages about $9.50 per ton and total costs range from $4 to $4.75 per ton. To date shareholders have received $20,000,000 in dividends.

New Capital Needed.

American investors control the Dome, Canadians own the Hollinger and McIntyre and British capitalists have recently undertaken to provide money for equipping a new property, the Davidson, which lies about four miles from the McIntyre and on same vein formation on which there are other considerable areas only awaiting capital for development.

The gold field next in importance to Porcupine is that known as Kirkland Lake about one mile from Swastika station. Here there are one main and two subsidiary gold-bearing ore-zones containing parallel veins. On the main zone there are eight companies working which own contiguous properties stretching for about three miles along the strike. American capital controls the Lake Shore and Wright Hargraves—the two most prosperous enterprises—and has a half interest in the Sylvanite. British capital is in Tough-Oakes and Sylvanite and also to some extent in the Lake Shore.

Gold Prospects.

The values found near the surface are poor, but enrichment takes place at about 400 feet where the width of the veins also improves. The Wright-Hargraves, for instance is stoping 15 feet wide at is 400-foot level and milling $16 ore in its efficient new plant producing at a cost of about $8. The prospects and properties in various stages of development in this region are numerous and influx of capital is awaited with confidence. The outlook for expansion appears to be good, for though the rock is much harder to grind than at Porcupine and the vein widths are considerably less, there is a compensating factor in usually higher value and smaller fluctuation, besides electric power available without shortage.

These are undoubtedly the two main gold fields of Ontario which will be developed in the next few years, but there are numerous promising enterprises to be had at Matachewan, Gauthier, Wolf Lake (Maisonville) West Shining Tree and other parts of the Larder Lake and Temiskaming Mining Divisions. It is necessary, of course, to have investigations made by competent engineers and geologists, but their employment now should give results far in excess of the expenditure involved. Moreover, the Provincial Government affords every assistance in the matter of providing information, and its engineers' reports, geological surveys and maps—complete in every detail—are obtainable on application at the Department of Mines, Toronto.

Mr. Norman Fisher, who was at Cobalt for some years as manager of the Temiskaming silver mine, and who is now an asbestos mine manager, was in Toronto last week.

REPORT OF MANAGER OF KERR LAKE MINE.

Mr. H. A. Kee, manager Kerr Lake mine in his report on operations for the year ending Aug. 31, says in part:

The production for the year ending August 31st, 1921, amounts to 194,351 ounces of silver and 17,096 pounds of cobalt. The above figures include 875 ounces of silver on hand August 31st, 1921, according to inventory. Of the total, 99,477 ounces of silver and 17,096 pounds of cobalt were produced from shipping ore and 94,874 ounces of silver from low grade ore milled by the Dominion Reduction Company at Cobalt.

Beginning in September, 1920, silver prices decreased rapidly from 91½ cents per ounce to 52⅝ cents per ounce in March, 1921, and under these altered market conditions our low grade mill ores could not be produced at a profit. It was therefore necessary to curtail operations in December, 1920, though our development work is being continued.

Exploration And Development.

During the year the total advance by drifting, crosscutting, raising and sinking amounted to 3,341. Lineal Feet as compared with 2,069 Lineal Feet during the previous year. The results from this work exposed some high grade values as well as a small additional tonnage of milling grade ore, though none of the exposures in Kerr Lake area proved of real importance. The greater portion of exploration and development work during the past year was done in the northerly and southerly extensions of the No. 3 Diabase Vein structure at different levels. While no important discoveries have been made, the results of development during the past year have been quite encouraging in the southeast Kerr Lake areas, all of which justified the expenditure.

During early operations a number of years ago very important high grade silver production from No. 3 Diabase Vein structure was procured in known horizons, the lower portions of which were about 125 ft. above the Lower Keewatin Diabase Contact, and as we have recently, in course of development, encountered pockets of high grade silver ore in close proximity to and both above and below this Contact, it is planned to continue development at favourable elevations along the Contact in Kerr Lake and Hargrave areas, as there are good possibilities for developing important ore shoots near the Contact.

Drifting northerly and southerly below the Contact at the 550 ft. Level, on the No. 3 Vein both in the Keewatin-Chert and Basalt, has exposed patches of high grade silver ore at points in the vein structure, where slightly schisted Lamprophyre formation is found associated with the persistent Cobalt-Calcite vein structure.

It is interesting to note that, while drifting north from the No. 3 Winze on the 550 ft. Level, gold values were exposed at one point of enrichment both in the Chert Wall Rocks and Cobalt-Calcite vein matter. The better gold values, however, were found in the Cobalt vein matter 2 in. in width, which essayed from $1.20 to $28.00 gold per ton, while the values in Calcite-Quartz vein matter indicated from $1.00 to $7.80 gold per ton, and the Chert Wall Rock lying close to the vein structure contained from 40 cents to $1.20 gold per ton. These gold values are not of commercial interest, but definitely indicate the possible existence of gold-bearing formation associated with the underlying Basalts.

Development included 1,975 ft. drifting, 889 ft. crosscutting, 397 ft. raising and 79.5 ft. sinking.

The silver production of individual veins for the year was as follows:

Vein System.	Development Ounces.	Stoping Ounces.
Crusher Vein	.....	1,560
No. 218 Side Vein	.....	2,598
Main East Vein	.....	6,244
No. 3 Lake North Vein	.....	11,706
Fleming Stope	.....	12,449
No. 3 Lake Vein	.....	4,535
Big Chamber	.....	5,406
Little No. 7 Vein	.....	897
No. 7 Vein Stope	.....	1,329
No. 7 Drift Intermediate	1,036	.....
No. 3 Lake Drift	812	.....
Main East Raise	812	.....
No. 3 Vein	.....	15,055
No. 3 Vein Hargrave	.....	20,223
No. 3 Vein Hargrave	15,750	.....
Totals	18,410	82,002

The mill ore production was 11,234. Dry Tons containing 94,874 ounces averaging 8.4 ounces silver per ton as compared with 12.5 ounces silver per ton last year, and the profits from this production were materially decreased as compared with previous years.

The withdrawals from our No. 7 Mill Ore Dump amounted to 5,313 tons, which were treated at the Dominion Reduction Plant and included in the Mill Ore figures. The additions to our No. 3 Mill Ore Dump amounted to 1,183 tons.

There was hoisted 7,342 tons ore, of which 49 tons was sacking grade and 7,293 tons milling ore.

The opportunity having presented itself, we procured a working option on the Hargrave property consisting of 80 acres. The results of development fully justified our anticipations and the property was purchased for $16,500, since which time a small ore shoot in the Hargrave area has produced in high grade ore about 36,000 ounces silver, and we anticipate that at least an equal production will be produced from this area in the future.

Silver values both in Hargrave and Kerr Lake areas will be extracted more advantageously when general production operations are again resumed. Preparations are made for the resumption of production operations, which will largely depend upon the future silver market conditions.

REPORTED GOLD STRIKE IN B. C.

The Vancouver Province recently stated that a very rich gold strike is reported on Cedar Creek, on Quesnel Lake, in the Caribou. Stakers of claims are reported to be taking out $35 a day in coarse gold, some very large nuggets being found. Great excitement prevails in the Horse Fly and Quesnel Forks districts.

R. Paterson, formerly an engineer at the Lenora Mine, Vancouver Island, and later professionally employed in the Slocan, passed through the Province recently, visiting Wm. Fleet Robertson, Provincial Mineralogist, Victoria. It was twenty years since he last saw British Columbia.

EXPERIMENTS IN COKE PRODUCTION.

Washington, D.C.—The obtaining of good grade coke from coals which seemed devoid of any cooking property has been accomplished by investigators at the University of Illinois, Urbana, Ill., working in co-operation with the United States Bureau of Mines, by the employment of a specially devised low temperature cooking process. As a result of the process, valuable by-products, in the way of ammonia, gas and tar, are derived.

The experiments were undertaken in connection with an investigation by the Bureau of Mines of the smoke problem at Salt Lake City, Utah. It was found that coke was regularly obtained from only a few coals tributary to the Salt Lake City district, and, if the use of coke, a smokeless fuel, was to be increased in that city, it would be necessary to demonstrate the possibilities of coking coals not regularly used for that purpose. Six coals from various Utah districts were tested.

Although, so far as present standards of coking indications are concerned, the coals tested seemed quite non-coking, treatment by the methods devised by Prof. S. W. Parr of the University of Illinois resulted in a yield of good coke amounting to approximately 60 per cent. of the coal employed. The coke is dense and of good texture, and seems adapted to use as a domestic fuel and for metallurgical purposes. In some respects the coke seems superior to anthracite for use in domestic furnaces. Slightly more than 20 pounds of ammonium sulphate, valuable as a fertilizer, were recovered per ton of coal coked. The gas recovered as a by-product is especially suitable for utilization in city mains. The tar oils obtained should lend themselves readily to cracking processes, thereby furnishing a product suitable for motor-fuel purposes, and may also prove a source of creosote oil and other wood preserving materials. These tar oils, on account of their marked drying properties, may also be available for paint and varnish manufacture. Other uses suggest themselves, such as direct combustion in engines of the Diesel type, as fuel for steam generation, as a source of heat for metallurgical purposes, the carburetting of water gas, and as the source of pitch as a binder for the briquetting of breeze, lignite fuels, etc.

The results of the investigation are of two-fold importance, indicating the possibility of coking many coals not generally considered to have coking qualities, and also constituting a factor in the solution of the smoke problem in communities not favorably situated for the obtaining of smokeless fuel.

POWER ON ABITIBI.

The Toronto Mail and Empire gives prominence to the following despatch from Timmins, Ont.:

A new feature has been injected into the Porcupine electric power supply, which is the most important factor in this gold camp's growth, by the intimation that the Ontario Government has reserved rights on the falls in the vicinity of the Big Bend, Abitibi River. This is the power that Hollinger endeavored to secure last Spring. Officials of the mine said then that granted the rights they would proceed at once to develop power and that they calculated that they would be delivering power to their mine early in 1922. A proposal has been made by responsible officials of the T. and N. O. Railway Commission that the commission develop this power in connection with their railway extension north of Cochrane, which touches it, and sell part of the energy to public consumers. This, according to The Northern Miner, which claims to be speaking with authority.

The falls is rated at from 15,000 to 30,000 horsepower. The commission gets the rights in view of its plans to electrify the northern section of the railway. Electrification would take from three to four years to prepare for, and when a line was ready there would still be a surplus. It is proposed that power be sold at cost to mines and other consumers. The falls is about sixty miles from Porcupine, the likeliest consumer.

Despite the new chance that Hollinger could get power to supply its extra needs from the commission, if the proposals are proceeded on, officials of that mine are known to be not very well pleased with the turn of events. They see that even if the commission goes ahead with the idea it would be two or three years before it would be ready to sell current. And Hollinger wants the power right away. They want to add to the mill, for they are not satisfied with 4,000 tons a day capacity. The mine manager is meeting the directors this week in Montreal on the power question.

The Porcupine mine managers feel that the water supply of the Mattagami, where the camp's current is now generated, is not sufficient as at present developed to permit the expansion that the gold resources of the mines calls for. McIntyre this year secured the rights on Sturgeon Falls, on that river, and Hollinger applied for and surveyed the falls on the Abitibi River, which it is understood have since been given to the Railway Commission.

Dome has made no outside move; it has directorial connection with the private power interests.

For the coming Winter the power outlook contains nothing that should cause serious apprehension. Additional water storage works have been completed, and if the extra area fills up before Winter the present supply should be assured. But the mines are all anxious to expand, and expansion with the present available amount of electric energy would be a most optimistic action, to put it mildly. That is why McIntyre has postponed the work of doubling its mill.

Mining men feel that as the mines are anxious to employ more men and produce more gold they should be given every assistance in the way of power rights or immediate power supply to do so.

TORONTO COAL PRICES.

Toronto, 18th Oct.—The threatened railway strike in the United States is causing a considerable "flutter in the dove-cots" among coal men and manufacturers in this country. Already it has had the effect, as regards bituminous coal, of sending up the price of lump twenty-five cents a ton, while slack remains at the same price as before, but firmer. One coal man of prominence told the writer to-day that if, at the end of the next three days, the strike still appears imminent, then coal might fetch almost any price at all. Unless consumers order coal within that time, and the strike really materializes, they are likely to go short for some while—in fact, until the United States Government is able to operate the roads efficiently—for it takes a week or ten days for coal to reach the border. Manufacturers here do not seem to think that the strike will materialize, but many of them are resolved to be on the safe side anyway, and to that end are sending in "hurry up delivery" requests for coal they have previously ordered.

Northern Ontario Letter

THE SILVER MINES.

Good Results at Keeley Mine.

One of the most interesting and important developments in recent years in connection with the silver mining industry of Northern Ontarion has occurred on the Keeley Silver Mines in South Lorrain. The representative of the Journal investigated the early reports of a big discovery at depth on the property and received official confirmation. The find was made at a depth of 435 feet at a point where a cross-vein lies at right angles to the woods vein on which milling values have been encounter. A feature of the discovery is that at this deep level, heavy oxidation occurs and which is pronounced by engineers to be pre-glacial. While the woods vein contains average values of about 28 ounces to the ton across a width of upwards of four feet, the new deposit has a width of about eight inches, and with values averaging about 4,000 ounces of silver to the ton across a width of about four inches for a distance of 32 feet in length as so far developed. Production from the Keeley during September amounted to approximately $90,000 and the indications are that October results may show a still further increase.

Profits are Higher.

Quotations for silver continue to hold at well over 70 cents an ounce, being 72¾ cents at the time of writing. As a result of this, the gross value being produced by such mines as the Nipissing, Mining Corporation, Coniagas and O'Brien is heavy while the margin of net profit on each ounce produced is the highest in many months.

The hydro-electric power supply in Cobalt is abundant and the supply of labor is in excess of current demand. As a consequence of this, the operating mines are working at maximum capacity and at greatly reduced costs For this reason, the balance sheets at the end of the current year may be expected to be exceptionally satisfactory.

Silver Cliff.

A scheme is under way to reopen the old Silver Cliff mine at Cobalt. An examination of the underground workings has been made, and the condition of the mine is said to be such as to encourage the belief that it could be operated profitably.

McKinley-Darragh.

The question of re-opening such mines as the McKinley-Darragh, Temiskaming and Beaver Consolidated appears to be uncertain and there is a growing belief that nothing may be done until the coming spring.

Lang-Caswell.

A deal which has been pending for the Lang-Caswell property in Lorraine is still hanging fire. A bid has been made for the property with a view to carrying on operations for the purpose of mining cobalt metal, but the outcome is still uncertain.

Elk Lake and Gowganda.

The Ontario Government has a force of 60 men engaged on road works on the highway from Elk Lake to Gowganda. This is approximately half as many men as were employed a few weeks ago. The road has been put in first class condition to a point 18 miles from Elk Lake and less than 10 miles from Gowganda. A motor bus is now employed in carrying passengers over the first 18 miles. The work will be suspended within the next week or so on account of the approach of winter.

It is stated that freight going into Gowganda district amounts to the equivalent of about one carload per week, this small tonnage being due to a tendency to await snow roads before hauling any very great amount of supplies, and, also, due to uncertainty on the part of property owners over the question of whether conditions have become sufficiently favorable to carry on general operations.

There are good prospects of the Cane Silver Mines in the township of Cane being re-opened this fall. Interests identified with the Hudson Bay Mining Company at Cobalt are interested in the enterprise and are considering a plan to work the property on a big scale.

THE GOLD MINES.

Power and Labor.

Features in connection with factors bearing upon the gold mining industry of Northern Ontario are the present big surplus of men and the general outlook for hydro-electric power.

The mines are all fully manned, and applications for jobs amount to an aggregate of over 100 daily. The companies are selecting those best fitted for the work and are operating at full capacity.

The dam which is intended to raise the water in Lake Kenogamisse about 10 feet and back it up for a total distance of about 30 miles has been completed and all surplus precipitation will be caught and stored for generating power throughout the winter. The power company officials are confident no shortage will be felt, although some of the mine officials are apprehensive. In any event, nothing like the serious shortage of the past winter is anticipated.

Weather conditions are mild throughout the north at the time of writing, and with the water gradually rising in the storage basins, it is obviously a race between this rising water and the approaching winter in determining whether or not the power supply will be sufficient to carry on operations at normal capacity until the spring break-up.

Hollinger Treating 3,500 tons Daily.

The Journal correspondent went through the mill of the Hollinger Consolidated this week where the full 200 stamps were in operations, together with 20 tube mills. The plant continues to treat an average of approximately 3,500 tons daily and the company is realizing an income of about $35,000 daily. This tonnage is the equivalent to 70 cars of ore daily, each weighing 50,000 pounds.

Drilling Rochester Property.

Diamond drilling operations are proceeding satisfactorily on the Rochester property. The Nipissing Mining Company of Cobalt has an option on the property, and the exploration work is being done on the strength of the location of the property adjacent to the Hollinger Consolidated on the north-west.

Carbon Problem Solved.

The occurrence of carbon in the ore in certain parts of the lower workings of the McIntyre-Porcupine has constituted a greater metallurgical problem than has generally been understood outside of those closely identified with the operation of that mine. However, Mr. Dorfman, the mill superintendent, has carried on certain experiments which offer promise of solving the difficulty.

Dome Treating 1100 tons Daily.

It has been learned officially that the mill on the Dome Mines is now operating at full capacity of upwards of 1,100 tons daily. The plant is rated at a maximum of 1,500 tons daily and at one time operated at an average

rate of 1,350 tons every twenty-four hours. However, the higher grade nature of the ore now being dealt with has necessitated a change in methods which, in turn, has made it imperative to deal without more than between 1,000 and 1,200 tons of ore daily. The current income on the Dome is at the rate of close to $2,500,000 annually. The company is fully supplied with men and hydro-electrie power, 2,800 h.p. being employed in the operation.

Ontario-Kirkland.

By early December, according to present indications, the new 100-ton mill on the Ontario-Kirkland mine will be ready for operation. The mine has been developed extensively and there is every prospect of the mill being quickly brought up to full capacity.

Teck-Hughes.

It has been learned officially that plans are being made to call a meeting at an early date for the purpose of discussing ways and means of reaching a satisfactory understanding as between the bondholders and the stockholders of the Teck-Hughes Mining Company. The property is now working on a substantial earning basis and the re-adjustment or re-organization is regarded as likely to be mutually satisfactory to the interests involved.

Kirkland Lake Proprietary.

Good progress is being made in the development of the Tough-Oakes and Burnside properties of the Kirkland Lake Proprietary. It is understood to be the intention of the management to continue development throughout the winter with a view towards placing the mill in operation in the early spring.

The recent decision of the promoters of a light railway project through the outlying mining districts of this part of Northern Ontario to clear 100 miles of right of way has aroused considerable interest, but there is obviously a tendency to await construction of the line before commencing mining operations on properties along the proposed route.

Crown Reserve in Larder Lake.

The entire aspect of the larder Lake district has undergone a change in the light of comparatively recent developments on property owned by the Crown Reserve Mining Company. Surface exploration has opened up a body which measures approximately 30 feet in width and in which the average gold values are stated to amount to $6 to the ton.

Associated Purchases Costello Property.

Another feature of the situation in the Larder Lake district is that the Associated Goldfields which was previously the chief operation in the Larder Lake field has suspended operations on its original holdings and has purchased the Costello property which lies adjacent to the Crown Reserve.

It is also learned that the Coniagas among other Cobalt companies has become interested in mining claims in this part of the Larder Lake district.

Fort Matachewan Area.

According to official information received by the Journal correspondent, there are good prospects of the Matachewan Gold Mines resuming operations during this fall or early in the coming winter. This opinion is based upon the belief that arrangements will be made to develop hydro-electric energy on a water fall which has heretofore been held under lease and with no effort at development.

At a depth of 100 feet on the Thesaurus property, north of Fort Matachewan, good results have been encountered. This property was originally known as the Nelson Clair. Gold tulleride occurs in spectacular quantities in a narrow pay-streak in the shaft, and the outlook for the property is believed to be exeellent.

In the townships of Rankin and Doon, interest in the reeent gold discovery has subsided somewhat, although assessment work is being done in some instances.

Lightning River.

On the property in the Lightning River district, owned in part by the Lightning River Gold Mines, some very spectacular ore has been opened up in a narrow vein in a pit which is down seven feet at the time of writing.

British Columbia Letter

Figures recently published by the Dominion Bureau of Statistics on the mineral output of Canada for the first half of the current year are particularly interesting to British Columbia in several particulars. With respect to lead it is shown that the total Canadian production for the first six months of 1921 was 32,875,616 lbs., valued at $1,883,773. Approximately 30,625,616 lbs. came from this Province. As the aggregate output of the Province for 1920 was 39,331,218 lbs., it will be seen that the 1921 half year is but 8,705,602 lbs. behind the results of the full 1920 period. The zinc record is not as good but, nevertheless, it is remarkable in that of the total Canadian output of 28,236,103 lbs., valued at $1,369,168, for the half year all must be credited to this Province. To equal the zinc production of 1920 it is necessary in the second half of the present year to produce 18,972,165 lbs. Although the zinc market appears to be more or less stagnant at present there is little doubt that this will be achieved. The Sullivan Mine and the Trail Smelter, Canadian Consolidated Mining & Smelting Co., are responsible for British Columbia's showing in connection with silver production, 6,545,481 fine ounces, this Province is credited with contributing 27.8 per cent. In Copper, too, the Canadian West appears to have done exceptionally well under the circumstances. The final year's totals, judging from the first official statistics available, will not be as unsatisfactory, speaking comparatively, as the general slackness in the metal market, and the consequent inactivity in connection with some phases of mining, would have led the statistical speculator to suppose.

Stewart, B.C.—H. Tanner, superintendent of the Fish Creek Mining Company, reports that a cross-cut on the lower workings designed to tap an ore body located recently has been driven forty feet and that No. 2 tunnel in the same locality also is in a strong and well defined vein. Work is to be resumed on No. 1 tunnel. Mr. Tanner says that development, which has been satisfactory, may be continued all winter and that accommodation is being provided for men with that end in view.—The difficulties of the Algunician Mining & Development Co., owners of the Spider and other mineral properties in the Portland Canal section, are said to be on the mend. Finances are expected to be available soon to meet outstanding endebtedness and to permit continuance of work on the Spider as well as on other promising prospects. — The Riverside Mineral Group, situated a short distance from the Salmon River Road, is being opened up, by the Lindeborg Brothers who report that a substantial body of ore has been shown giving average assay returns of $20 a ton in gold and silver. — The Independence Group, Bear River at Goose Creek, owners Fitzgerald Brothers, is said to

show in its development an exceedingly large body of milling ore. It is located within easy transportation range of the coast. — Former Senator John Ronan, of Alaska, is en route from Stewart with one thousand pounds of samples of ore from the mines and prospects of the Portland Canal District for display at the American Mining Congress, Chicago, Ill.

Anyox, B.C.—In addition to new development started on the Dolly Varden, Kitsault River, on which some fourteen men are employed, there is activity on the Homestake Group and the "Moose," both in the same section. On the latter 186 feet of tunnel work has been done on the lower level and 66 feet on the higher. Picked samples of ore have run as high as 240 ounces in silver to the ton. — High grade ore is reported to have been struck on the Lucky Strike, Cascade Falls, Silver Crown and Sunnyside mineral claims, which are in the vicinity of the Homestake.

Nelson, B.C.—The Bayonne Gold Mining Company has been re-organized and it is understood that its property, situated in the Bayonne District, not far from Ymir, will be re-opened and developed further, the work to start soon.

Trail, B.C.—Up to an including the 30th September the receipts of ore at the Trail Smelter of the Consolidated Mining & Smelting Co., aggregated 307,493 tons, which is about 50,000 tons better than last year at the same date. If the work of mining and treating continues at the same rate for the rest of the year the 1921 figures will establish records. For the closing nine days of September the receipts of ore at Trail were 7,983 tons, of which 7,629 tons came from the company's mines. Eight independent properties also were represented, constituting one of the heaviest shipping lists of the year to date. Of these the Bell shipped 27 tons, the Josie 125, the Knob Hill 95, the Paradise 45, the Ruth, of Ainsworth, 41; the Sally 18, the Freedy Lee 2, and the Skyline 1.

Vancouver, B.C.—Placer mining is likely to become active along the North Arm of the Fraser and Bridge River if the plans announced by a Vancouver Syndicate for the exploitation of the "Channel" Leases are carried through. The construction of a flume 700 feet long, 30 feet wide and 4 feet high is proposed as a preliminary step towards the commencement of hydraulicking. The road to the district is being repaired by the Government to permit the easy transport of machinery and supplies. Recent amendments to the Placer Mining Act resulted in the throwing open of the ground. — Judgment in favor of the heirs of the late Captain Alexander was given by the British Columbia Courts in connection with the action brought by stockholders in the original Engineer Mining Company whose claim is that Capt. Alexander and his associates "jumped" the claims and that, therefore, the title is unsound. The Court held that Section 85 of the B. C. Mineral Act constituted a complete bar to the plaintiff's success. This section deals with adverse claimants to mineral claims and stipulates that any contest concerning the rights of another to a claim must be marked by the commencement of action in the supreme court within 60 days of the first publication in the B. C. Gazette. This publication is one of formal procedure in securing title. The Act further states that failure to commence such an action shall be considered a complete waiver.

STANDARD STOCK EXCHANGE QUOTATIONS.

Silver.	High.	Low.	Last.
Adanac Silver Mines, Ltd..	1¼	1⅛	1⅛
Bailey	2¾	2¾	2¾
Beaver Consolidated	25½	25	25
Coniagas	1.65	1.65	1.65
Crown Reserve	12	12	12
Foster	2	2	2
Kerr Lake	3.38	3.38	3.38
La Rose	38	34	37
McKin.-Dar.-Savage	23½	22	23½
Mining Corp. of Can.	1.15	1.10	1.10
Nipissing	5.85	5.80	5.85
Ophir	1½	1½	1½
Peterson Lake	6⅞	6⅜	6½
Temiskaming	24½	24½	24½
Trethewey	12½	11½	11½
Victory	26	25¾	25¾
Gold.			
Atlas	15	14¼	14¼
Dome Extension	70	70	70
Dome Lake	7½	7½	7½
Dome Mines	20.85	20.25	20.25
Gold Reef	2⅛	2⅛	2⅛
Hollinger Cons.	7.50	7.36	7.40
Hunton Kirkl'd G.M.	10	8	8
Keora	15	12½	13¼
Kirkland Lake	36¾	36½	36¾
Lake Shore M. Ltd	1.28	1.24	1.24
McIntyre	1.98	1.90	1.91
Newray Mines, Ltd	6	5	5
Porcupine Crown	14¾	12	12¾
Porcupine Imperial	½	½	½
Porcupine V.N.T.	17½	17½	17½
Preston East Dome	2⅝	2⅝	2⅝
Schumacher	24	23	23
Teck-Hughes	15¾	15	15½
Thompson Krist	3¼	3	3¼
West Dome	8	7	7
West Tree Mines, Ltd	4	4	4
Wasapika Gold M. Ltd.	4	3⅞	4
Miscellaneous.			
Vacnum G.	4⅜	4	4

METAL QUOTATIONS.

Following are the fair average prices for ingot metals (in less than car-loads):

Toronto.	Cents per lb. 19th Oct. (Unchanged since last week)
Copper, Electric	17
Copper Casting	16¾
Tin	35
Lead	6¾
Zinc	7½
Aluminum	27
Antimony	9

NEW ORE LEDGE IN B.C.

Alice Arm, B.C.—A new ore ledge is reported to have been located on the Silver Tip Group, which adjoins the Homestake Group. It is 12 feet wide and carries galena and copper values. The owners have commenced tunnelling and other development.

The Canadian Miners' Buying Directory.

Acetylene Gas:
Canada Carbide Company, Ltd.
Prest-O-Lite Co. of Canada, Ltd.

Acetylene Welding:
The Toronto Iron Works, Ltd.

A.C. Units:
Powley & Townsley, Limited.

Agitators:
The Dorr Co.
Can. Chicago Bridge & Iron Co., Ltd.
Horton Steel Works, Limited.

Air Compressors:
Belliss & Morcom, Ltd.
Laurie & Lamb

Air Hoists:
Canadian Ingersoll-Rand Co., Ltd.
Mussens, Limited.

Air Receivers:
The Toronto Iron Works, Ltd.

Alloy and Carbon Tool Steel:
Peacock Brothers Limited.

Alternators:
MacGovern & Co.

Aluminium:
Spielman Agencies, Regd.

Amalgamators:
Northern Canada Supply Co.
Mine and Smelter Supply Co.
Wabi Iron Works.

Antimony:
Canada Metal Co.

Antimonial Lead:
Pennsylvania Smelting Co.

Assayers' and Chemists' Supplies:
Dominion Engineering & Inspection Co.
Lymans, Limited
Mine & Smelter Supply Co.
Pennsylvania Smelting Co.
Stanley, W. F. & Co., Ltd.

Ash Conveyors:
Canadian Link-Belt Company

Ashes Handling Machinery:
Canadian Link-Belt Co., Ltd.

Assayers and Chemists:
Milton L. Hersey Co., Ltd.
Campbell & Deyell
Ledoux & Co.
Thos. Heys & Son
C. L. Constant Co.

Asbestos:
Everitt & Co.

Balls:
Hull Iron & Steel Foundries, Ltd.
Peacock Brothers Limited.
The Wabi Iron Works.
The Hardinge Conical Mill Co.
The William Kennedy & Sons, Ltd.

Ball Mills:
Hardinge Conical Mill Co.
Hull Iron & Steel Foundries, Ltd.
The Wabi Iron Works.
The William Kennedy & Sons, Ltd.

Babbit Metals:
Canada Metal Co.
Hoyt Metal Co.

Ball Mill Feeders:
Hardinge Conical Mill Co.
Hull Iron & Steel Foundries, Ltd.

Ball Mill Linings:
Hardinge Conical Mill Co.
The William Kennedy & Sons, Ltd.
Peacock Brothers, Limited
Hull Iron & Steel Foundries, Ltd.

Belting—Leather, Rubber and Cotton:
Canadian Link-Belt Co., Ltd.
The Mine & Smelter Supply Co.
Northern Canada Supply Co.
Jones & Glasco.

Belting:
R. T. Gilman & Co.
Gutta Percha & Rubber, Ltd.

Belting—Silent Chain:
Canadian Link-Belt Co., Ltd.
Hans Renold of Canada, Limited, Montreal
Jones & Glassco (Regd.)

Belting (Transmission):
Goodyear Tire & Rubber Co.

Belting (Elevator):
Goodyear Tire & Rubber Co.

Belting (Conveyor):
Goodyear Tire & Rubber Co.
Gutta Percha & Rubber, Ltd.

Bins and Hoppers:
The Toronto Iron Works, Ltd.
Can. Chicago Bridge & Iron Co., Ltd.
Horton Steel Works, Limited.

Blasting Batteries and Supplies:
Canadian Ingersoll-Rand Co., Ltd.
Mussens, Ltd.
Canadian Explosives, Ltd.
Powley & Townsley, Limited.

Bluestone:
The Consolidated Mining & Smelting Co.
The Coniagas Reduction Co., Ltd.

Blowers:
Canadian Fairbanks-Morse Co., Ltd.
Northern Canada Supply Co.

Boilers:
Canadian Ingersoll-Rand Co., Ltd.
Marsh Engineering Works
R. T. Gilman & Co.
The John Inglis Company
Wabi Iron Works.

Blue Vitriol (Coniagas Red):
Canadian Fairbanks-Morse Co., Ltd.

Borts and Carbons:
Diamond Drill Carbon Co.

Boxes, Cable Junction:
Standard Underground Cable Co. of Canada, Ltd.
Northern Electric Co., Ltd.

Brazilian Rough Diamonds:
Diamond Drill Carbon Co.

Brazilian Mica:
Diamond Drill Carbon Co.

Buggies, Mine Car (Steel)
Hendrick Manufacturing Co.

Brazilian Ballas:
Diamond Drill Carbon Co.

Brazilian Rock Crystal:
Diamond Drill Carbon Co.

Brazilian Tourmalines:
Diamond Drill Carbon Co.

Brazilian Aquamarines:
Diamond Drill Carbon Co.

Bridges—Man Trolley and Rope Operated—Material Handling:
Canadian Mead-Morrison Co., Limited

Bronze, Manganese, Perforated and Plain:
Hendrick Manufacturing Co.

Buckets:
Canadian Ingersoll-Rand Co., Ltd.
R. T. Gilman & Co.
Hendrick Manufacturing Co.
Canadian Link-Belt Co., Ltd.
Marsh Engineering Works
Mussens, Ltd.
MacKinnon Steel Co., Ltd.
Northern Canada Supply Co.
The Wabi Iron Works

Buckets, Elevator:
Canadian Link-Belt Co., Ltd.
Hendrick Mfg. Co.
Peacock Brothers Limited.

Cable—Aerial and Underground:
Canada Wire & Cable Co.
Northern Canada Supply Co.
Standard Underground Cable Co. of Canada, Ltd.
Peacock Brothers, Limited

Cableways:
Canadian Mead-Morrison Co., Limited
Fraser & Chalmers of Canada, Ltd.
Mussens, Ltd.
The Wabi Iron Works
R. T. Gilman & Co.

Cages:
Canadian Ingersoll-Rand Co., Ltd., Montreal, Que.
Northern Canada Supply Co.
Fraser & Chalmers of Canada, Ltd.
The Electric Steel & Metals Co.
The Mine & Smelter Supply Co.
Mussens, Ltd.
The Wabi Iron Works

THE MAID OF ERIN.

"The Maid of Erin," as yet a prospect, situated near Rainy Hollow, a little known section of British Columbia lying to the west of the Atlin District with Alaskan territory to the south and Yukon territory to the north, is likely to be heard from if present indications are borne out by further exploration and development.

R. W. Wiley has been working in a small way on the property for the past two or three seasons. He has sunk a shaft a considerable distance, asserts that he is in ore all the way, that is cannot yet be said that all that is to be seen has been seen or all that is to be proven has been blocked out, and that the picked ore sacked and shipped last year and this has been running up to 25 per cent copper and 60 ounces of silver to the ton. In short Mr. Wiley, a Klondyke sourdough and an operator with experience in many American mining fields, is enthusiastic in speaking of the "Maid of Erin," although frank in declaring that it is but a "prospect" up to the present. Still he knows that it is a superlatively good "prospect" and is confident that it is going to make one of the new big mines of the north.

The Alaskan Road Commission has been spending considerable in the opening up of the district in question, having at present a first class road under construction from Haines, a small but prosperous community situated in American territory near the headwaters of Lynn Canal, north to the Canadian border. The work, apparently, has been costly as it is said that, roughly $60,000 was expended last year and that this year's operations will account for $20,000. However, when it is finished it will tap a new country, rich in minerals and with other possibilities. Its route is along the Chilkat river and up the north bank of the Klehini River. This road is being continued by Mr. Wiley and his associates to the mine.

Hitherto the work of opening up this property has meant the meeting and overcoming of serious difficulties, mainly in regard to transportation. Heavy tractors, however, have succeeded in bringing to Haines, down the valley of the Klehini and along the old road, the inconsiderable shipments that have thus far been made. The term, of course, is used in a comparative sense because, when the problems to be met and the number of men employed are considered, the ore shipped actually makes a creditable showing in quantity as well as in quality. Horses have been used to some extent in the transportation of supplies and Mr. Wiley tells of an experience in fording the Klehini, a turbulent glacial stream the character of which is constantly changing. A powerful horse slipped and tumbled in the river center and was carried, pitching and rolling, for fully half a mile before bringing up on a bar. He had instinctively kept his head up and when rescued was without serious injury. The rider had managed to safely reach the far bank. But such adventures, and in fact all difficulties that have been instrumental in holding back work, are expected to be passed very shortly now and the operators are looking forward to putting the Maid of Erin permanently among the shippers of the Province.

PORT ARTHUR MINING NOTES.

By J. J. O'CONNOR.

The expected has occurred at Silver Islet. After encountering a number of calcite stringers at various points in the new drift, the first of which was struck 250 feet from the old workings, a well defined vein ten feet in width, was met 723 feet in. This vein has all the characteristics of the old Silver Islet vein. At first glance it might very well be mistaken for the old material.

The drift is not now in the graphitic portion of the dyke. Mr. Peacock is of the opinion that when this portion of the dyke is reached by drifting on the vein, that it will be found to contain silver values, thus confirming the theories on which they are working. He is also of the opinion that this vein is a part of the Catholic Point vein, as it was met with at about the point where the latter should intersect the dyke, but is not nearly so wide as where it shows on the Point.

The first of stringers encountered had a westerly dip, each succeeding one had a lesser westerly dip, until they reached the perpendicular, after that each stringer had an increasing easterly dip toward a common point, bringing all the stringers together at a depth of 1,500 feet below the surface, or 1,500 feet below the present workings. The Islet Exploration Company have most sanguine expectations that their enterprise will meet substantial success, and result in placing Silver Islet in its old-time position as one of Canada's oustanding silver producers.

Good reports continue to come in from the Schreiber gold area. Satisfactory results are being obtained at the McKellar-Longworth property in the development of both No. 1 and No. 2 veins, both showing very high values, the latter carrying high values in tellurides.

EDITORIAL

"COAL OUT OF LINE."

"Iron Age" in the issue of October 13th states "The high cost of coal is undoubtedly a great impediment to industry. If cost has anything to do with consumption, and that is an accepted argument as to most commodities and as to freight rates, the high cost of bituminous coal is certainly a great drag upon industry. The price of coal f.o.b. mine is a serious concern to practically every one, for all are consumers of coal. There is no other article of commerce whose cost is so widely felt. ...At present the ambition of the union miners seems to be to charge the public, after April 1st 1922, with back pay for the time they have been idle of late, as well as for the time they may lose in a strike. This is a matter of the greatest concern to the public".

To no portion of the public is it of greater concern than to the remainder of unionised labour, as it is the high cost of coal that is the greatest obstacle to reduction of railway freights and general resumption of manufacture. Coal is the last great staple that is out of line with other commodities when compared with pre-war figures. The miners appear to have made up their minds that coal can be maintained on its giddy pinnacle, but they must inevitably discover that it cannot. The English miners had the same idea, but after testing it out they have freely and fully recanted their economic heresy. The revival of trade in Britain, the resumption of manufactures and exports, and the rise of sterling, are all results of a return to a more normal alignment of coal among other commodities in Britain. Coal is certainly "out of line", and so long as it remains out of line, business will stay out of joint.

Nor must it be forgotten that provision for employment for the steel workers—an industry just beginning to show appreciable signs of recovery—is dependent upon the coal trade, and that the keeping open of the mill can only be rendered possible by the reduction of wages in the mines. On this point Mr. Roy M. Wolvin, the president of the British Empire Steel Corporation, very properly laid special emphasis in the course of an interview in Montreal on Monday last, in which he indicated the possibility of the mines of Nova Scotia being closed down during the coming winter as the result of trade conditions and the determination of the miners to oppose any reduction in the rate of wages at present ruling. As he said, the most urgent questions for consideration, in the coming wage negotiations with the United Mine Workers, is not the rate of wages, but whether they can be paid at all, "and most earnest joint consultation and endeavor will be required, if severe and protracted unemployment at the collieries in Nova Scotia is to be averted."

Mr. Wolvin added that "the same wages as during the war, plus two heavy increases since the armistice, are being paid to the workers of the Dominion Coal Company and other coal companies in Nova Scotia. That fact must be faced in the wage negotiations. These high wages are being paid in a period of unparalleled trade depression. The price of coal has declined along with that of other commodities, but to a smaller extent, and no action of the employers of mine-workers can be taken that will enable coal to stand out singly against a world-wide decrease in commodity prices arising from world-wide causes. That course was attempted in Britain and most signally failed."

It may not be easy for the rank-and-file of the miners to realize that, while last year saw great, and almost unparalleled, prosperity in the coal trade, high selling prices and high wages occurring together, the inevitable time of depression is upon us now. The depression in the coal trade of the world, and in the allied steel trades, too, is the most acute known to modern times. But although the rank-and-file of the miners may not realize these facts, on their import, they must be well within the knowledge of their leaders. And the latter, if, in any sense, worthy of their position, must further be aware that, in the very nature of things, a period of smaller earnings must necessarily

also be one of lower wages. On these leaders, accordingly, there devolves a very heavy responsibility. We know that it is no easy task, and we are very sure that it cannot be other than an ungrateful one, for them to press on the miners the necessity of accepting wage reductions. But it is a task from which there is no escape if they are to be faithful to one of the prime and primary obligations of their position of leadership—the obligation to tell the workers the truth, even when that truth is hard.

It is not merely foolish, but it is absolutely futile to attempt, in this period of almost unexampled depression, to maintain wages at a standard which, in the circumstances of today, the coal industry simply cannot pay, except at a loss which it is impossible for it to contemplate. When coal profits were high, wages in the coal mines were high also—and rightly so. Now the lean times are upon us, the workers in the mines must accept reduced wages, if the industry is to be kept in being. Had labor leaders in other industries advised the adoption of such a course, unemployment, with all its concomitant evils, would be far less widespread in Canada than it is today. It is devoutly to be hoped that the leaders of the coal miners may show themselves inspired by wiser counsels, and, we may add, a higher patriotism.

OIL FIELDS OF THE EMPIRE.

The petroleum resources of the world have received much attention during recent years, the great demand for oil having stimulated search in all countries. It has been recognized that known resources must be greatly added to if the requirements are to be met. The recent explorations in the far northwest are but an indication of the effort that will be made by oil companies to find new sources of supply.

It is important that there should be available some concise account of the petroleum resources at present known, particularly of those within the Empire. This has been appreciated by the Imperial Institute, and, under the direction of its mineral resources committee, there has just been published by John Murray, London, a monograph on Petroleum. Special reference is made to resources of the British Empire, and the resources of foreign countries are also dealt with.

The sources and possible sources of supply within the Empire and dependencies are: Great Britain, Malta, British Borneo, Sarawak, Cyprus, India, Mesopotamia, Palestine, British Cameroon, Egypt, Sudan, Gold Coast, Nigeria, Somaliland, South Africa, Barbadoes, British Honduras, Canada, Newfoundland, Trinidad, British Guiana, Australia, Papua and New Zealand.

The United Kingdom produces very little oil, and that comes chiefly from oil shales deposits in Scotland. In Malta, test drilling is contemplated, as the geology is favorable. In British North Borneo, prospect wells are being drilled. In Sarawak oil is being produced, and a refinery has been erected at Lutong. In Cyprus, there are indications of oil, but rock structure is not favorable. Most of the oil produced in India comes from Burma, which district, in 1919, produced 1,174,995 tons. Assam and the Punjab are small producers.

The existence of petroleum and asphalt in Mesopotamia has been known for a very long time. The oilfield in this country is only part of a petroliferous area which extends through southern Persia to the north end of the Persian Gulf, passes through Mendeli on the Turko-Persian frontier and crosses the Tigris near El-Fatha. The belt is approximately 1,000 miles long, and covers an area of more than 26,000 miles. Three main oil zones are recognized. The largest production is at present obtained from an area of about 246 acres near Tel Kejara, the annual output being about 1,500 tons. Near Zakho there are numerous seepages over an area of about 120 acres, which yield from 250 to 300 tons per annum. Along the Euphrates River, the asphalt deposits of Hit and Ranadi have been known from ancient times, the yield of asphalt from the wells near Hit being estimated at about 2,500 tons per annum.

In Palestine, petroleum and asphalt occur. The asphalt deposits near Hasbeya are regularly mined, the output, about 380 tons per annum, being exported from Beyrout. Oil issues from cliffs facing the Dead Sea, and at several points along the shores there are hot springs bringing up traces of petroleum.

In the Egyptian oil field, which resembles those of Persia, the production in 1920 was 155,578 tons. Gemsah was the main producing area up to 1914, but since that date its output has greatly diminished, and commercial production is now practically confined to the Hurghada field. Storage tanks have been erected at Gemsah, Hurghada and Suez, with a capacity of about 100,000 tons. At Suez, there is a refinery capable of treating about 1,000 tons crude oil per day. Pipe lines have been laid to deep water at three shipping berths at Port Tewfik.

In the Gold Coast and in Nigeria, there are petroliferous lands, but no commercial quantity has been produced from the wells so far sunk. In South Africa, results of oil prospecting have, so far, not been successful.

In Canada, indications of oil have been found in many places, and exploration is now being carried on in the Western Provinces. Southern Ontario is the chief producing centre, and its output is declining. The discovery of oil at Fort Norman in 1920 has led to exploration of the Mackenzie river basin. In southern Alberta, prospecting is being carried on in several places.

In Trinidad, the principal producing area is the Forest Reserve, near Brighton. The famous pitch lake has an area of about 100 acres, and there is a constant

stream of pitch, towards the sea, averaging 15 to 18 ft. in depth. It is estimated that the lake contains 3,168,000 tons of pitch. The petroleum production of Trinidad in 1920 was 297,588 tons.

In British Guiana, negotiations are in progress for a concession granting exploration rights over 2,000 square miles, with the option of choosing therefrom an area of 100,000 acres for prospecting and development, if the results of geological investigation are favorable.

In Australia, efforts to locate deposits of petroleum have so far been unsuccessful. The Commonwealth Government has offered a reward of £10,000 for the discovery of natural oil in commercial quantities in Australia, and a bonus of £5,000 has been offered by the South Australian Government to the person who first obtains 100,000 gallons of crude petroleum from a well in South Australia.

In Papua, the Anglo-Persian Oil Co., is carrying on prospecting work for the British and Australian Governments.

In New Zealand, prospecting for oil has not given good results, oil being found only in small quantities.

NORTHERN INDUSTRIES AND THE RAILWAY.

The extension northward of the Ontario Government railway, the growth of the pulp and paper industry and the successful development of big gold mines at Porcupine are bringing the Hudson Bay district much closer to older Ontario. It should not be long now before a new settlement springs up in the wilderness seventy miles beyond Cochrane and little farther from James Bay. The building of the railway and the development of water powers on the Abitibi for the mining industry for the pulp and paper industry and for the railway will hasten development of this area.

The townspeople of Cochrane, through which the traffic of the north will pass, have good cause to feel that their town is to benefit largely from the mining and pulp and paper industries, which the construction of the railway made possible, and which have, in turn, been the chief source of revenue of the railway. The extension of the Government railway is, to a large extent, made possible by the mining activities at Cobalt, Porcupine and Kirkland lake. But for the mining industry and (more recently) the pulp and paper industry the railway would have been such a burden that no extension would have been thought of for many years. The building of the railway made possible the industries which now, by their growth, are leading to the development of an area much further north. The railway and the two industries owe so much to one another that it may confidently be expected that a way will always be found to satisfactorily solve problems arising from conflicts of interest, provided a serious endeavor is made by all concerned.

SILVER RESOURCES.

The monograph on silver ores written by Mr. H. B. Cronshaw, and published by John Murray, to which we made reference a couple of weeks ago, is one of the series prepared under the direction of the Mineral Resources Committee of the Imperial Institute. It summarizes the sources of supply of silver ores in the British Empire and in foreign countries, giving special attention to the resources of the Empire. An introductory chapter is devoted to the occurence, characters and uses of silver.

The Imperial Institute has a special staff engaged in the collection, critical revision and arrangement of all important information respecting supplies of minerals. This report on silver ores should, therefore, be found useful for its account of the silver resources of other countries.

EDITORIAL NOTES.

The Geological Survey, Ottawa, has published a summary report, part D, on investigations carried on by some members of the staff in 1920. The contributors are T. L. Tanton, T. T. Quirke, M. Y. Williams, Aleph Anrep, Joseph Keele, M. E. Wilson, J. F. Wright and Robert Harvie. The Ontario districts reported on are Thunder Bay, Nipigon-Schreiber, Geneva map area, Lower Albany and Lower Kenogami rivers, Manitoulin island, Madoc fluorspar area, and Brockville-Mallorytown map area. Asbestos deposits in Bonaventure, Quebec, were examined by Mr. Harvie. Mr. Keele reports on clays and sands of Northern Ontario and Mr. Anrep on peat bogs in Ontario and Quebec.

The fluorspar deposits of the Madoc area are described fully by Mr. E. Wilson in the survey report.

Geological features of the area immediately surrounding Thunder bay have been studied by T. L. Tanton for the Geological Survey and a contoured map of the area has been prepared. Mr. Tanton calls attention to the faulting of the area, which is particularly important because the known silver deposits occurred in faults.

The Nipigon-Schreiber area is briefly described in the Geological Survey summary report by Mr. Tanton. He describes two types of veins: 1. quartz veins which are locally pegmatitic and which carry disseminated pyrite; 2. carbonate replacement bodies.

Oil possibilities of Manitoulin Island are described by M. Y. Williams, who spent some weeks on the Island in 1920.

The Dome mines report for the first half of the company's fiscal year, shows that excellent results are being obtained. Development during the past year has been very favorable and, with the improving con

ditions the prospects for a good year are bright. The results such as are being obtained by Hollinger, Dome and McIntyre are making Porcupine one of the brighter spots in the industrial world this year.

On another page will be found an account of the rediscovery of British Columbia's first silver mine. We understand that arrangements have been made for the working of this property, which has been idle many years.

It has been reported from Cobalt that the rights to water power on the Abitibi river which had been applied for by Hollinger Consolidated Mines, have been turned over to the T. & N. O. Railway Commission. We are advised that this has not been done.

The coal briquetting plant at Bienfait, Saskatchewan, is said to be ready for operation. It is an experimental plant, which the Federal Government and the Saskatchewan and Manitoba Governments have erected with a view to utilizing lignite coal deposits.

That tar sand areas in northern Alberta are attracting capital is reported from Winnipeg. Utilization of these sands is a problem well worth attention as the deposits are very large.

The "Northern Miner" reports that very good results are being obtained in development of gold deposits at Lightning river and at the Bidgood mine in the Kirkland lake area.

The "Mining Journal," London, is running an article by R. C. Campbell-Johnston on the occurrence of petroleum in Western Canada.

There has been constructed in Queen's Park, Toronto, a cairn composed of the products of Ontario mines. Large blocks of ore have been assembled in this way with a view to interesting the passers-by in the mineral resources of the provinces.

The wire rope testing machine at 5 Queens Park is now in operation. Mines Inspector Sutherland broke the first rope last week. This machine has been installed for the purpose of testing wire rope used at mines. Previously the Government had no machine of its own and certain clauses of the regulations were not enforced pending this installation.

A COURSE IN INDUSTRIAL METALLOGRAPHY.

For several years there has been given in the department of metallurgy at McGill University, an extension course in Metallography which has been attended by Mechanics, Engineers, Chemists, and those desiring a "Hobby" or whose business brought them in contact with metals and who desire to have more knowledge of their composition.

No previous knowledge of the subject is assumed and the course is essentially practical from first to last. Ferrous and non-ferrous metals are dealt with equally and training given in preparing them for examination under the microscope and finally photographing the various structures developed.

Anyone desiring to enroll should apply to Dr. Alfred Stansfield Department of Metallurgy McGill University or to the lecturers Harold J. Roast F.C.S., F.C.I.C., or Charles F. Pascoe F.C.I.C.

The first class will be held on Monday evening November 7th at 8.30 P.M. in the Chemistry building McGill University.

Fee for the course of 15 periods is $20.00.

As only fifteen members can be accommodated application should be made at once.

The microscopic equipment has been added to considerably this year especially in regard to the photographic end. If any former members desire to continue their work, provision will be made for an advanced class if sufficient members are obtained.

WANTS ROADS FOR FISH CREEK DISTRICT.

Victoria, B.C.—Henry Benson, who has returned from the Fish Creek section of the Portland Canal District, says that the Fish Creek Mining Company has about twenty men at work and is prepared to continue operations through the winter. Mr. Tonkin, the manager of the property, is said to look for an output of $80,000 worth of ore in the next six months. Ten men are at work on the "Big Missouri," Mr. Benson states. Both the Hoveland and the Lucky Boy Group in the Fish Creek region are being energetically developed. The latter is about five miles from tidewater and is accessible by means of wagon road and train. Describing the work as far as it has progressed on the Lucky Boy, Mr. Benson says that there are three tunnels and a shaft 20 feet in depth. The main tunnel (100 feet in) was finished on September 20th and the main lead was struck and has been cut for three and one half feet. At 83 feet in a copper-silver lead was struck, which assayed $55.60 per ton in silver, copper and gold values. In the property is a water-fall which the Company is reported to have secured for power purposes on application to the United States Government.

After referring to the Premier Mining Company, explaining that the finishing touches now are being put on the aerial tramway, and after dealing generally with the mining possibilities of the whole section, Mr. Benson recommends that the Provincial Government expend an even greater sum than already has been invested in roads in that country and, in this connection, refers to the policy of the United States in the following terms:

"Every ton of ore has to come out of this district through the Fish Creek district on the American side. The American Government has done great work on the wagon road this season in the Fish Creek district. Many men with the most modern appliances for road making were at work the whole season and, besides the road gang, the Government had a trail building gang out from the beginning of July. This gang built a splendid trail to the Interior back of Fish Creek which will be of the utmost benefit to prospectors."

British Columbia's First Mine

By A. S. WILLIAMSON.

A great deal of history and romance has been written about the early days of placer mining in British Columbia, but little has been recorded of the early history of Lode mining in **British Columbia.** Although great wealth was derived from the Gold diggings, Lode mining has produced ten-fold more.

While operating a mining property on the Fraser River near the town of Hope (once a Hudson Bay outpost known as Fort Hope) some Indians told me a story of an old mine rich in silver on Issulick Mountain that shipped boat-loads of silver fifty or sixty years ago, and that their old people used to pack the ore on their backs from the mine to the river. According to their story the mine was discovered by an Indian called Peter Emery who ran across it while hunting goat. He showed the ore to a white man named Schooley in the then famous gold camp of Yale. Schooley bargained with the Indian to show him where the ore was, this the Indian did on Schooley trading him a rifle and a coffin to bury his wife in, which was all the Indian ever got out of his discovery, although it made Schooley rich.

I learned later that Schooley afterwards took up his residence in Victoria, (the only town of any importance west of Toronto in those days) married one of the leading Society girls there, and started out to have a good time, until one day whilst drunk, he got into an argument with his father-in-law and shot him, he was tried a few weeks later and hanged for his crime.

Information in Government Reports.

As the story seemed to me to be out of the ordinary run of stories usually told by Indians about lost mines, I decided to find out the truth of the story and prospect around for the mine. Before starting out, however, I determined to get any data I could that was reliable, so I wrote to the Compiler of Geological Information, Ottawa for information regarding the old "Eureka Victoria" mines, located 1868, and receiving an answer to the effect that the Reports of Progress were out of print for 1871-1872, but that he was pleased to quote a few paragraphs regarding the "Eureka" mine which were as follows:—

"In our report of progress for 1871-1872, page 57, Dr. Alfred R. C. Selwyn states:— "I was not able to examine the site of the silver mine near Hope, but was informed that the proprietor of the claim valued it at $300,000. Difficulty of transport, the high price of labour, and the lack of requisite capital have, however, prevented its development.

"The mine is situated 7 miles south of Hope on the Fraser River at an elevation of 5,000 feet above tidewater. Messrs. Geo. Dunbar and Thomas Schooley are the proprietors, they state that the vein is from 3 to 12 feet wide, that a tunnel has been driven on it for 190 feet, and that it can be seen for a thousand feet on a strike N.E. and S. W. dipping S. E. 80 deg. — 90 deg. The specimens for analysis (for which see Dr. Hunt's Report) were taken from a heap of several tons and were considered a fair average of the whole."

In the Report of Progress for 1871-1872, page 66, is a statement by Dr. T. Sterry Hunt as follows:— "Silver ore from the 'Eureka' mine near Fort Hope. These specimens show a vein-stone of spathic iron with some quartz, through which is disseminated a massive steel-grey ore giving a black powder, and yielding by analysis sulphur, antimony, copper and silver. From the comparatively large proportion of antimony which the ore contains it would seem to be a highly argentiferous Fahlerz of Friebergite. An average sample of the vein-stone, in a much decomposed condition gave 380 ozs. of silver, of which .11 per cent was present in the form of chloride, and was dissolved from the raw ore by a solution of Hyposulphite of Soda, other considerable masses of the ore would yield a much larger proportion of the previous metal."

In our Report of Progress for 1876-77, the Minister of Mines of British Columbia describes it as follows:— "The first lead called the 'Eureka' mine crops out about 5,000 feet above river level, is well-defined, four to seven feet in thickness and has been traced for 3,000 feet. A tunnel has been driven into this lead for 190 feet. The ore is described as an argentiferous grey copper and has yielded, under assay, $20 to $1,050 worth of silver to the ton."

"During the time the above lead was being worked, another about 300 feet distant was discovered, this is of a far more valuable character, and is called the "Van-Bremer" mine. The ore is described as chloride of silver, and has yielded, under assay, from $25 to $2,403 of silver per ton of rock. A quantity from the outcrop sold at San Francisco at $420 per ton. This lead is distinctly traceable for half a mile."

Assaying Outfit Discovered.

After receiving the Government reports, I decided that a little time would be well spent trying to discover the old mine, so getting an early start one morning, in company with an Indian, we spent several hours trying to pick up the old trail in a tangle of dead falls with a top dressing of devil clubs, and after following the old blazes for about two miles, the trail became well-defined, in places almost wide enough for a waggon. After this there was no difficulty in following it until, at an altitude of about 5,000 feet, just at timberline we came to an old cabin with the roof smashed in. Lying all around were old tools, 1½ inch steel with Bull Bits that made them look like baseball bats, old black powder kegs, and empty paper cartridges which were loaded with the black powder for blasting purposes.

There was also a 5½ foot cross-cut saw, without drag teeth, with the handles rivetted on, apparently the saw must have been considered a new-fangled idea, as I could find no place where it had been used, trees from 2 feet to 5 feet in diameter being cut through with axes.

At one end of the cabin was a huge fireplace, at the other a cast-iron cook-stove with an assortment of old-time cooking utensils even to the sheet zinc stove pipe just as good today as it was fifty years ago.

More interesting was the remains of an old assaying outfit, showing that the old-timers took no chances in shipping anything but the best when their nearest smelters were San Francisco and Swansea, Wales.

Close to the cabin around the roots of an old tree

were discovered quite a lot of ore samples, which from their appearance looked as if I had not come on a wild goose chase.

Satisfied to call it a day's work, we cooked supper, afterwards boiling our beans for next day in the same old three-legged iron pot that, without doubt, had rendered similar service fifty years before, then throwing our blankets down in a corner of the old cabin, went to sleep with sincere admiration for the nerve and enterprise of the old-timers who opened up British Columbia's First Mine, at that time 3,000 miles from a railroad.

First Indications of Ore.

Next morning there was little difficulty in picking up an old trail that led down along the face of an almost sheer cliff. Coming towards a very narrow ravine cutting at right angles to the trail, I noticed the ruins of an old blacksmith's shop, just on the other side of which was the ravine, the bottom of which was filled with snow. Crossing the snow, I discovered an opening underneath which showed indications of ore on the side of the ravine, evidently the hanging wall of a vein. Crawling down between the snow and the wall I located the Adit, about ten feet in. Under the snow the opening was filled up with sand and rocks to within two feet of the roof. Lighting a candle, I crawled in over the top to find three feet of water standing in the tunnel, feeling around with my feet, I found that I was standing on a old wooden track Continuing for about a hundred feet, I came to an old car on the track still in good working order. A short distance from the face were some tools, and on a ledge some old tallow dips, as if the miners had just gone off shift.

In driving the tunnel the ore was followed on the hanging wall. The orebody varied in width from a few inches to two feet with about two feet of high-grade ore in the face. No attempt had been made to crosscut, for this I couldn't blame them considering their tools and the black powder then in use.

After taking a few samples I did some more wading and came out just in time to prevent my Indian friend from starting down hill after a rescue party.

How It Had Been Worked.

Shortly after noon, I picked up a trail leading off in a south-westerly direction, following it for about a thousand feet it crossed a rock-slide at the mouth of a narrow ravine with walls about 300 feet high. The ravine was apparently caused by the erosion of a porphyry dyke cutting the vein nearly at right angles — this was evident from the large amount of ore and vein matter all over the slide. Finding no way of getting into the ravine, I continued on for a few hundred yards when the ruins of an old stone house blocked the trail in the face of a sheer cliff. The builders had used the overhang of the cliff for the roof, building the end walls of stone, and facing up the front with logs, making very comfortable quarters with "safety first" written all over it as there was no snow-slide that could ever harm it.

Among the ruins there were quite a lot of old tools, a 90-lb. anvil and a fifteen or twenty gallon milk can exactly the same as used these days for shipping milk, only that it had leather straps on it, evidently it had been used for packing water up from a small lake 500 feet lower down at the foot of the cliff which must have been some man-sized job, although from the number of empty whisky bottles lying around, it might not have been such hard work after all. This old camp, I afterwards learned went by the name of Victoria House, being on the Victoria claim.

Quite close to the camp the trail crossed a vein and a considerable quantity of ore, where apparently there had been sorting sheds.

Looking up the face of the cliff there could be seen what seemed to be a tunnel about 100 feet up, at intervals all the way up there were pieces of steel driven into the rock on which wooden ladders had been hung, pieces of which were lying at the foot of the cliff. By throwing a rope from one piece of steel to the other I got into the old workings which consisted of two tunnels and a large open cut very much like a glory hole. The ore was of the same character as the "Eureka" vein, only very much higher grade in places—this may be the Van-Brenmer lead mentioned in the Government Reports.

After doing the staking (relocating the claims) we made for camp just as the darkness set in.

Looking down the mountain from an altitude of nearly a mile could be seen the C. P. R., Transcontinental express flashing like a firefly along the canyon of the Fraser taking the place of the old stern-wheel steamers and pack trails of the early sixties when the first staking was done.

Among the original subscribers to the memorandum of Association of the two Mining Companies formed to operate the mines were the well-known pioneers and business men of the Province, S. P. Moody whose address is given as Burrard Inlet, and after whom Moodyville is named, Hugh Nelson, afterwards Lieut.-Governor Nelson the owner of the first saw-mill in Vancouver Harbour; George Dietz, of Cariboo Road fame; Francis Garesche, J. C. Hughes, R. P. Rithet, and others equally prominent in the early history of British Columbia.

CANADIAN ENGINEERING STANDARDS ASSOCIATION.

The Sixth Meeting of the Main Committee of the above Association was held on Monday, October 17th, at the Association's Office in Ottawa, Mr. H. H. Vaughan in the Chair. The Specification for Wire Rope, as approved by the Main Committee in August is now in the press and will shortly be issued. The Specification for Steel Railway Bridges (No. 1-1920) being now out of print, active steps are being taken in preparing a new edition, in which a number of important alterations and improvements are being incorporated, with a view of bringing it into agreement with the most recent practice of the large railway administrations. The first draft of the Highway Bridge Specification has been amended and is now being held, in order that it may be brought into general conformity with the provisions of the revised Railway Bridge Specification.

The work of the Sub-Committees on Incandescent Lamps, wood poles for Transmission Lines, and Watthour Meters is actively proceeding. The Committee approved the list of members for the Sub-Committee on Concrete and Reinforced Concrete and it is expected that this Committee will commence its work at an early date with a view of preparing general specifications for these materials, based on the existing specifications of the Engineering Institute of Canada. The Specification for Portland Cement is being finally revised by the Sectional Committee, and will be submitted to the Main Committee for approval and publication at an early date.

Nova Scotia Collieries

Recovery of B. E. Steel Corporation's Output from Low Work of Efficiency and the Necessity of Reducing Miners' Wages.

The coal output of the several companies of the British Empire Steel Corporation for the current year for the nine months ending September 30th was as follows:

	Dominion Coal Company		Acadia Coal Co.	N. S. S. & C. Co.
	Cape Breton	Springhill		Cape Breton
January ..	256,748	39,645	54,786	53,041
February ..	227,030	43,123	46,429	45,653
March	196,005	37,402	42,349	39,570
April	175,324	33,523	16,454	32,332
May	272,947	32,310	9,574	40,492
June	295,449	25,397	28,368	61,300
July	283,364	20,752	29,302	56,257
August	321,908	22,927	27,608	54,761
September .	272,819	27,169	21,088	54,140
	2,301,594	282,848	275,958	437,546

Total of combined companies for nine months 3,297,946

The average monthly output for the combined companies so far in 1921 has been 366,000 tons. The production during the remaining quarter of the year is not likely to exceed this average, and is likely to fall much below it, particularly if the Dominion Iron and Steel Company does not receive the orders for rails from the Canadian Government railways that are said to be in prospect. The production of the combined companies in 1920 was 4,839,402 tons, but in 1921 it does not appear likely that the coal outputs will aggregate more than 4,400,000 tons. The capacity of the Corporation's mines, as may be judged from the foregoing figures, is, with existing labour forces, probably about 475,000 tons monthly, or at the rate of 5,700,000 tons annually. If the maximum recorded coal production of the combined companies is taken, representing the performance of the year 1913, it will be found that this was 6,500,000 tons, so that there has been a decline in capacity of the mines for output of twelve percent. When disorganization of working forces during the war period was at its worst point, the capacity of the mines for output was decreased by from thirty to forty percent, so that recent figures of production indicate substantial recovery from the low mark of working efficiency. The proper proportion of faceworkers to other workers is not yet restored, but it is much bettered, and partial employment has increased the output of contract workers.

The Question of Wages.

The wage agreement between the Nova Scotia coal companies and the United Mine Workers of America in District 26 expires at the end of November next, and it is expected that the coal companies will ask for a substantial reduction in wages in any new wage agreement that may be negotiated.

The St. Lawrence season is approaching a close, and it is expected that some 1,200,000 tons will have been sent up the River from Nova Scotia coal-mines when navigation closes. This is the largest season's coal shipments since the season of 1914-1915, and while it represents real progress in the recovery of the Montreal market for the Nova Scotia mines, it is a long way from reaching usual pre-war shipments, which ran between 1,500,000 and 2,000,000 tons in the season of open navigation.

When the St. Lawrence outlet closes, the position of the collieries will become very difficult unless some revival of steel production takes place. The plant of the Nova Scotia Steel & Coal Company at Sydney Mines has not made a pound of steel since November 1920, and the Sydney Plant has few if any orders in prospect. The alloting of a rail order to the Dominion Steel Company is largely a question of a cost of production of steel which will justify the Government at Ottawa in making purchases at this time, and this in turn is altogether a question of the cost of mining coal. The wages of the steelworkers have been reduced by thirty percent, but the wages of the coal-miners, under the agreement of last November, remain at the highest point ever paid in Nova Scotia.

Miners' Wages Must Come Down.

The only possibility of commercial operation of the steel plants in Nova Scotia lies in the reduction of coal-miners' wages. If no outlet for coal is found through steel manufacture, the only possibility of finding employment for the colliery workers during the ensuing Winter months will be to bank out coal in expectation of sales in the St. Lawrence markets next Spring. In face of a declining market for bituminous coal and a tremendous over-development of bituminous coal mines in the United States it will not be advisable for the coal companies in Nova Scotia to attempt to finance the heavy expenditures that banking-out coal requires unless the coal can be mined at an expenditure in wages and materials which will be not less than the probable selling price of coal next Spring in the St. Lawrence markets. High railway freights, plus surtax on rail freight-charges and pit-mouth coal prices for exchange premium on New York funds, have been responsible for from $1.50 to $2.00 per ton on the price of coal in Montreal. A likelihood of reductions in rail freights, and a lessening of the surtax on exchange by improvement in the value of the Canadian dollar, will combine to bring about a lessening of the delivered price in Montreal next Summer, irrespective of the price at the pitmouth in the United States or the profit of the dealer in Canada. The state of business and the attitude of the banks will in any case discourage the undertaking of expensive banking-out programmes in Nova Scotia during the coming Winter. If a reduction in wages can be arranged that will permit of mining coal at a cost to meet American competition next Spring a limited amount of employment will be possible at the collieries.

Wages and Cost of Living.

Coal miners wages in Nova Scotia rose with the increased cost of living to a point from 120 to 150 percent above the figures of 1914. The cost of living, as estimated by the Department of Labour at Ottawa, reached a peak in July 1920 that was 100 percent above 1914 figures, and has since dropped to a point about 60 percent above 1914. It is therefore evident that coal-miners wages in Nova Scotia could undergo a very

substantial reduction and yet leave the net earnings of the miners much higher, relatively, than they were in 1914.

It is anticipated that a wage reduction will be arranged at the expiry of the current agreement with the U.M.W. of A., probably under protest from the union, but the complete inability of the coal companies to continue to pay war-time wages in a period of wide-spread trade depression and acute unemployment leaves no choice to either side.

THE CHUCHUA COAL FIELD.

Authoritative information indicates that the report of Capt. James McEvoy, included in "Coal Fields of British Columbia," necessarily based on surface observations, does not do full justice to the possibilities of Chuchua field. Although it covers a limited area it now promises to become a factor in the solution of the fuel problems of the Kamloops District, B.C.

The seam operated at present pitches between 14 and 15 degrees and the following is an approximate section of it as exposed at the working face:

Roof, Sandstone; Coal, 14 inches; Slate, 6 inches; Coal, 12 inches; Slate, 3 inches; Coal, 6 inches; Bone Coal: Mixed with rock. A band of very good blacksmith coal has been discovered among it.

On the south bank of the Newhykulston Creek a four foot outcrop of apparently good coal has been found. The same seam, with a thickness of about six feet, has been reached by a Calyx drill hole on the north side of the creek at a depth of 35 feet. A haulage slope now is being driven towards it and work also has begun on a second opening.

The output has reached 25 tons a day. The mine run, hauled in small cars up a small slope by a minuscule hoist, after being passed over an improvised screen, is stored in small bunkers whence it is hauled to the railway siding, a good mile distant, by motor trucks. Nut and slack, mixed, are supplied to the Tranquille Sanitorium and the Lump Coal is shipped to Kamloops, Vancouver and Everett.

The power plant at the mine consists of a 44 h.p. boiler, a diminutive air compressor and a small generator, supplying a current of 12 amperes by 110 volts to run the fan and charge the Edison lamp batteries.

PERSONALS.

Mr. Hugh B. Gillis has been appointed Superintendent of Ore Mines & Quarries for the British Empire Steel Corporation. Mr. Gillis has for a number of years been in charge of the iron-ore and limestone mining of the Dominion Steel Corporation, and his duties will now be enlarged to include the supervision of the ore mines and quarries of the Nova Scotia Steel & Coal Company at Wabana, Newfoundland and in Cape Breton. Mr. Gillis is a graduate of St. Francis Xavier College at Antigonish in Arts and of McGill University in Mining Engineering. He is a member and counsellor of the Mining Society of Nova Scotia and the Canadian Institute of Mining & Metallurgy.

Mr. Samuel W. Cohen, Consulting Mining Engineer of Montreal, was the official representative of the University of Minnesota at the McGill University Centenary.

B.C. COAL PRODUCTION.

The coal production of the Province of British Columbia shows little variation when figures for the month of September are compared with those of the previous month. There has been a very slight falling off, a matter of 3,757 tons, spread over the whole of the Province.

In the Crow's Nest Pass there were smaller tonnages produced at Coal Creek Collieries and at Corbin while at Michel there was an increase. On Vancouver Island the output was kept at practically the same mark while in the Nicola-Princeton Field there was some decline.

The total production for the month of August for British Columbia was 252,677 tons while for the month of September it was 248,920 tons.

Following are the detailed figures:

Output of Coal for Month of September 1921.

Vancouver Island District.		
Canadian Western Fuel Co., Nanaimo	68,470	
Canadian Collieries (D) Ltd.,		
Comox	37,952	
South Wellington	7,802	
Extension	19,016	
Nanoose Wellington Collrs., Nanoose	5,733	
Granby Consolidated M.S. & P. Co.,		
Cassidy	22,374	
Old Wellington (King & Foster)	604	
Total	161,951	161,951
Nicola-Princeton Collieries.		
Middlesboro Collieries, Middlesboro	5,311	
Fleming Coal Co., Merritt	3,444	
Coalmont Collieries, Coalmont	7,604	
Princeton Coal & Coke Co., Princeton	1,666	
Total	18,025	18,025
Crow's Nest Pass District.		
Crow's Nest Pass Coal Co.,		
Corbin Coal & Coke Co., Corbin	6,226	
Coal Creek	37,459	
Michel	25,259	
Total	68,944	68,944
		248,920

U.S. COAL PRODUCTION.

Production of soft coal increased sharply during the week ended October 15. The total output, including lignite and coal coked at the mine, is estimated at 9,696,000 tons, and increase of 573,000 tons over the week preceding. Despite this improvement production is still much below the level reached in the corresponding week of the past four years, the period over which records of weekly output extend. A year ago, for example, more than 12,100,000 tons were mined. The production in 1921 has not only been lower than in the years of active demand during and since the war, but it has also been lower than in the pre-war years. In the diagram above the heavy black line represents the average production per working day during each month of 1921. Only once has the 1921 line risen above the average for the years 1913 to 1916, and at that time American coal was in demand to meet the deficit in Europe caused by the British miners' strike. What the record for the month of October, 1921, will finally show remains to be seen, but the average for the first 15 days is only 1,568,000 tons, still below the pre-war level

American Electrochemical Society

Features of Fall Meeting at Lake Placid were Symposiums on Non-Ferrous Metallurgy and Electrodeposition.

It was generally conceded by all in attendance at Lake Placid that a most unique meeting place had been selected for a Fall Meeting. Through the courtesy of the Lake Placid Club their recreation facilities were placed at the disposal of members and afforded excellent opportunities for taking part in golf, tennis, motoring and mountain hiking. A great deal of the success of the Meeting is due to Mr. W. M. Corse, who spared no effort as acting chairman of the arrangements committee

On Thursday, September 29, at 9 A.M., the fortieth General Meeting of the Society was called to order by President Acheson Smith who then introduced Mr. Melvil Dewey, founder and president of the Lake Placid Club. Dr. Dewey cordially welcomed our members and mentioned several points of interest that everyone should see while at Lake Placid. The reading and active discussion of papers followed this talk and were continued in the mornings of the next two days, the features of which were respectively the Symposiums on Non-ferrous Metallurgy and Electrodeposition.

Each of the three technical sessions was attended by a number of members and guests who took active part in disenssing the papers presented. The result was that the proceedings, carried out according to schedule, were lively as well as interesting.

The Thursday morning session was filled by reading and discussion of papers:

Experiences with Alkaline and Alkaline Earth Metals in Connection with Non-ferous Alloys. Charles Vickers. Sodinm appears to have a negative value for copper, bnt seems to be superior to phosphorus in deoxidizing bronze. Calcinm, of the alkaline earth metals, appears valueless in producing sound copper castings. As a deoxidizer, calcium is best adaptable when combined with an acid element, as silicon, and is further improved when combined with a third element.

The Electrolytically Produced Calcium-Barium-Lead Alloys Comprising Frary Metal. W. A. Cowan, L. D. Simpkins and G. C. Hiers. This paper presented by Mr. Hiers described the development of Frary Metal and its production by electrodeposition from a mixture of calcium and barium chlorides over a bath of molten lead as cathode. The properties of Frary metal are compared with those of other bearing metals. As a bearing metal it has desirable hardness and strength at elevated temperatnres.

The Electrolytic Corrosion of Lead-Thallium Alloys. Colin G. Fink and C. H. Eldridge. Presented by Dr. Fink. Anodic corrosion losses in an acid copper sulfate electrolyte containing nitric and hydrochloric acids are reduced by using lead-thallinm alloys. A minimum loss of 1.2 lb. per 100 lb. of copper deposited resulted with a lead anode containing 10 percent Tl and 20 per cent Sn.

A New Theory of the Corrosion of Iron. J. Newton Friend. An auto-colloidal catalytic theory, which postulates the corrosion as starting by the formation of colloidal ferrous hydroxide. This by contact with the air forms hydrated ferric hydroxide which in turn is alternately reduced by contact with iron and oxidized by contact with air, thus continuing the corrosion.

Rust Prevention by Slushing. Haakon Styri. An extended research which shows that for protection against rust by greases a thorough cleaning of the steel parts by an aqueous solution is essential; an oil emulsion which leaves an oil film for short time protection is preferable. Such emulsions protect against rust.

Transformer Oil Sludge. C. J. Rodman. Of the three types of transformer oil sludge (asphaltic, soap and carbon), the asphaltic is the most general form and is the oxidation product of an attackable oil. It collects upon the active parts of transformer. The soap sludge forms slowly and is difficult to remove by filtration. The carbon sludge is caused by electrical breakdown.

The Electrolytic Dissociation of Cyanamide and Some of Its Salts in Aqueous Solutions. N. Kameyama. The degree of dissociation and of hydrolysis of sodium and calcium cyanamide was determined; from this the dissociation constant was calculated and the mobility of the cyanamide anion estimated.

The Electrolytic Oxidation of Hydrochloric Acid to Perchloric Acid. H. M. Goodwin and E. C. Walker. The investigation and data present the effect of acid concentration, current density, duration of electrolysis and temperature on the yield of perchloric acid. A cell yielding 800 grams of 60 percent acid per 24 hours is described.

Graphic Control of Electrolytic Processes. B. C. Worth. A graphic method of maintaining fixed conditions in potassinm chlorate production is presented. Of the three factors which influence the yield, two represent concentrations of 2 compounds one of which which is controllable by addition agents, and the third is temperature.

Friday morning was devoted to a Symposinm on Non-ferons Metallurgy. The papers included were:

The Influence of the Electric Furnace on the Metallurgy of Non-ferrous Metals. H. M. St. John. The nse of the Electric furnace in brass foundries and refining plants for melting purposes has revolutionized metal handling methods; a more uniform quality of product is obtained with less labor and less metal wastage. The attainments are better than have been previously possible and the secretiveness which has been characteristic of the non-ferrons industry is gradually being done away with.

Modern Developments in the British Brass Industry. E. A. Smith. The actual condition of the British brass industry are presented with a discussion of electric brass furnaces, hot pressing and forging of brass, rolling mill practice, annealing, etc.

Resistance Type of Electric Furnace in the Melting of Brass and Other Non-Ferrous Metals. T. F. Baily. The various features to be considered in making an electric furnace installation for melting non-ferrous metals are discussed.

Comparison of Electric Furnace Practice with Fuel Fired Furnace Practice. N. K. B. Patch. The author's experiences are that the cost of metal melted, the melting losses, and the solution of gases in metal, are substantially the same in the electric and the fuel fired furnace, provided intelligent operation is pursued.

Electric Silver Melting. H. A. DeFries. Describes advantages of electric furnace melting of silver and relates how a more ductile and tougher silver results upon introducing an iron block into the bath.

Electric Furnace Melting of Nickel-Silver. F. C. Thompson. Advantages of melting nickel-silver in the externally heated electric furnace are discussed.

Aluminum-Copper Alloys. R. J. Anderson. A discussion of the manufacture, properties and uses of the commercial aluminum-copper alloys employed in the United States.

Recent Developments in Electric Furnaces of the Muffled Arc Type. H A. Winne. Several types of muffled are melting furnaces are described with their features and adaptabilities.

Electric Furnace Purification of Zirkite. J. G. Thompson. The arc type furnace used in this investigation made it possible to remove 90-95 percent Si as an impurity from the Zirkite ore; the amount of carbon introduced being only sufficient to transform the silicon to the carbide.

Physical Characteristics of Specialized Refractories. Cross Breaking Strength at 20° and 1350°C. M. L. Hartman and W. A. Koehler. The tests were carried out on each of ten refractory materials at the temperatures indicated.

An Electrodeposition Symposium was the feature of the morning of the closing day of the Meeting, Saturday, October 1. The papers discussed were:

An Electric Steam-Generator for Low Voltage. F. A. Lidbury and F. A. Stamps. An inexpensive form of apparatus for the generation of steam by means of an alternating current of voltages from 100 to 500.

The Effect of Pressure on Overvoltage. H. M. Goodwin and L. A. Wilson. The values of overvoltage of hydrogen against copper, nickel and mercury electrodes were determined at pressures varying from one atmosphere to a few centimeters of mercury.

Researches on the Electrodeposition of Iron. W. E. Hughes. The result of several experimenters and those obtained by the author are related in the electrodeposition of iron from (1) sulphate solution, (2) chloride solutions and (3) sulphate-chloride solutions.

Electrolytic Solution and Deposition of Copper. T. R. Briggs.

Electrometallurgy of Zinc. W. R. Ingalls. The developments in the electrolytic zinc extraction process and the progress, in Scandinavia, of electrothermic smelting are set forth.

Deposition of Zinc from the Zinc Cyanide Solution. C. J. Wernlund. This research was carried out with the intention of obtaining a zinc cyanide plating solution which would operate successfully under the most trying commercial conditions.

The Electrodeposition of Lead-Tin Alloys. Wm. Blum and H. E. Haring. That a finer grained deposit of alloys of lead and tin can be obtained from fluoborate solutions than is possible when depositing either of the metals under similar conditions is established.

The Structure and Properties of Alternately Electrodeposited Metals. Wm. Blum. If during the deposition of copper thin layers of nickel are interposed, a deposit of greater tensile strength than pure copper results due to the restraining influence nickel has on the growth of copper crystals.

In all, the meeting proved to be most profitable, social and instructive.

DANGEROUS GASES LIBERATED IN MINES.

In Technical Paper 249, "The Determination of Oxides of Nitrogen," by A. C. Allison, W. L. Parker, and G. W. Jones, just issued by the United States Bureau of Mines, a new method for the determination of this noxious gas, sometimes formed after blasting in metal mines, is described.

The U. S. Bureau of Mines, in the course of its work looking toward the minimizing of accidents in mining operations, has occasion to make analyses of gases in determining the ventilation conditions and the hazards that may develop from exposure of the workers to gases liberated in mines. Not only is it important to identify such gases as form explosive mixtures and are at times liberated in large quantities, but in addition it is necessary to determine what gases have harmful effects upon miners who are exposed to them while at work. In metal mines where much blasting is done, the shots are often prepared improperly, and some oxides of nitrogen may be formed after firing. Moreover, other industries than mining produce oxides of nitrogen which have a deleterious effect on individuals breathing them for any length of time.

Two gases that result from the firing of explosives are, because of their physiological effects, important in mine ventilation. They are carbon monoxide and oxides of nitrogen. Other gases produced at the same time, including carbon dioxide, hydrogen, methane, and nitrogen, are unimportant unless in proportions sufficient to diminish appreciably the oxygen content of the mine air. Carbon monoxide and oxides of nitrogen usually occur together and are very harmful even when inhaled in small quantities. About 0.01 or 0.02 per cent is the maximum quantity of carbon monoxide allowable continuously in mine air without affecting the workmen harmfully, although as much as 0.04 per cent is harmless for periods of time not exceeding one hour. Very little data are available on the maximum quantity of oxides of nitrogen that may be tolerated in mine air without danger to the men working therein. The general conclusions are that 0.01 and 0.02 per cent of oxides of nitrogen is dangerous and under no conditions should 0.05 per cent be reached. Carbon monoxide can be determined to an accuracy of about 0.02 per cent by the usual Haldane analysis, but an accurate method of determining oxides of nitrogen at low concentrations has heretofore been impossible without using a large quantity of gas for a sample.

A method was desired by which very small quantities of oxides of nitrogen could be determined from a minimum quantity of gas, for samples of mine gases are taken most conveniently in vacuum bottles of about 250 c.c. capacity. The nitron method used by Gutbier and Busch is difficult to perform and can not be used at such low concentrations as are present in the usual mine-air samples. To be of value in mine-gas analysis, a method should be accurate to at least 10 parts per million, or 0.001 per cent. After explosives have been fired, especially in ventilated working faces, the products of the explosion are, of course, diluted with large quantities of air, and the amounts of oxides of nitrogen present will usually be lower than 100 parts per million (0.01 per cent). To determine these small quantities, a method was adapted from the usual procedure for the determination of the oxides of nitrogen in water analysis, applying the de-phenyl sulphonic acid method to give the total oxides of nitrogen as nitrogen peroxide

or as nitrates. By the use of the method evolved, ten parts of oxides of nitrogen as nitrate could be detected in one million parts of the air oxides of nitrogen mixture with an accurary of five or six parts per million.

Copies of Technical Paper 249 may be obtained by applying to the Director, U. S. Bureau of Mines, Washington, D.C.

PORT ARTHUR MINING NOTES.

By J. J. O'CONNOR.

Another rich vein has been discovered in the Schreiber gold area, south-east of Cook Lake, and about two miles north-east of the village of Schreiber. This discovery was made on September 26th. last, in the course of development work in that field. No definite particulars are to hand regarding the values contained in the vein gangue, it is announced, however, that it is one of the richest local discoveries yet made. The vein is said to be twenty feet wide, and can be traced for three quarters of a mile.

A new company to be known as the St. Anthony Gold Mines Ltd. has been formed to operate the old St. Anthony Mine, at Sturgeon Lake. It has been announced that financial arrangements are being completed in New York, whereby this property will be placed under active operation in the very near future. This property has recently been in the hands of a syndicate, headed by C. Lorne Campbell, formerly of Campbell & Deyell, operators of the ore sampling plant at Cobalt. Their attention has been devoted to putting the mining and milling facilities in shape to operate at capacity after the new start is made. The mill will have a capacity of approximately 150 tons of ore daily. The writer has seen plans of the underground development, together with the results of samplings of the entire body of ore blocked out, which has an estimated value of $1,250,000, and is suffieient to keep the mill running at capacity for over two years. Further development will be pushed with a full force of miners on the various veins on the property, in order to keep well ahead of milling reqnirements. The mine is well equipped with mining and milling plant, together with comfortable housing and office accommodation for a large force of men. Mr. Campbell will take personal charge of operations under the new regime. It is confidently expected that under his management, the St. Anthony will give a good account of itself, and confirm the opinions of mining engineers, that have been tenaciously held to since this property was first opened up. The successful operation of the St. Anthony, will do much to bring Northwestern Ontario back to its old position as one of the chief gold producing areas of the Province, and be an incentive to the opening up of the many promising gold claims in this district, that only await the coming of capital, and intelligent management, to prove their worth.

WORK AT SULLIVAN MINE.

Development work at the big leading zinc mine of the Consolidated Mining and Smelting Company of Canada, at Kimberley, in East Kootenay, is being most energetically pushed under the superintendency of E. G. Montgomery, the recent daily output of ore averaging 950 tons. The two new bunk houses recently erected on the townsite, were available when the recent fire destroyed the old bunk houses, which was most fortunate for the owners, for the buildings being available, made it possible to house the workmen. The burned cook and bunk houses were adjacent to the new tunnel, and were not very conveniently situated. It is planned to erect even a larger and more modern cook house near the new bunk house.

In order to make some necessary repairs at the mine, the Sullivan was closed down recently for about two weeks, but work was resumed the first of the present week with the usual force.

THE SILVER MARKET.

Samuel Montagu and Co. of London, Eng., in their letter of Oct. 6th, say in part:

"Recently the silver market has been made up of many confused elements. China has again posed as buyer and seller, even on the same day. The Indian Bazaars also have operated both ways, though selling has had the preponderance; the effect is shown in the easier tendency of prices. America and the Continent have partieipated in this double-minded method of doing business. Obviously, in these circumstances, issues are obscured. Besides the purchases by China in this market, substantial amounts for that quarter have been sent from India direct.

"Correspondents in Bombay inform us that the heavy buying for India which took place a month ago was in anticipation of a good up country demand later on, and in the expectation that if sterling exchange went up, the Indian price would fall and thus stimulate demand for the metal. It will be observed that in this way the silver market here can very easily become a medium for speculation in the exchange with India, as well as in the exchange with China. No wonder therefore that another Indian correspondent writes about the market that it is "worked up by so many currents that it is rather crazy to speak anything positive at present." Meanwhile it is of interest to note that the sterling value of the silver shipped to India and China combined, is about the same as during the same period last year—though the proportions to the respective destinations differ."

In connection with the silver situation the Financial Times, of London, Eng., recently had this to say: To what extent speculation has been responsible for the recent advance in silver, which has just touched 43⅜ per ounce, the highest price since last December, it is difficult to say, but there have been certain changes in the world conditions during the last few months which have undoubtedly tended to favour a rise in the price of the metal, and it is only natural that these should have been taken advantage of. The recent buying is reported to have come mainly from China, but it is difficult to find any economic reason for an increase in the demand from that source, except that stocks have been allowed to run rather low and an effort is being made to re-establish them. There is no mystery with regard to the previous fall in silver. The two principal causes were admittedly the sudden setback in the trade prosperity of India, and indeed of the Far East generally, coupled with the amount of the metal released by the dilution—to use a polite term—of our own subsidiary coinage, together with that of most of the other principal European countries. These two causes have begun to lose their effect. Since July the trade balance has again turned in favour of India, while the quantity of silver released through the substitution of nickel in our own coinage has mainly been absorbed.

IMPORTANT MEETING IN TORONTO.

Engineering Section of the American Association for the Advancement of Science Will Be Held December 27th to 31st.

The engineering section of the American Association is arranging an important program for the Toronto meeting which will occur from December 27 to 31, 1921. The arrangements for the engineering sessions are in charge of Mr. J. B. Tyrrell, mining engineer, of Toronto. The programs aim to present the application of science to the solution of engineering problems. Many of the addresses will deal especially with the recent accomplishment of scientific engineering in Canada. It will be shown how scientifically trained men have developed some of the natural resources of the Dominion and the means by which this has been accomplished. Addresses already arranged are on the work accomplished by the Hydro-Electric Power Commission of Ontario; on the mines and mining plants of Canada including a account of prospecting in the northern wildernesses; on the explorations for oil carried out in the valley of the McKenzie River by the Imperial Oil Company, and on the work of the Toronto Harbor for the accommodation of ships of ocean draft. All of them, and especially those dealing with exploration in the far north, will be of interest not only to engineers but also to geographers and to every one interested in the out-of-doors. These addresses will generally be accompanied by illustrations and in many cases by motion pictures. Other topics will be announced later.

IMMIGRATION, CAPITAL AND DEVELOPMENT.

A couple of weeks ago, we commented editorially on Sir Joseph Flavelle's pronouncement that a solution of the Railway problem in this country lies in the increasing of agricultural production in the Western Provinces. In his statement of the railway problem, Sir Joseph Flavelle presented a striking argument in favor of speeding up development, and we pointed out that, in our view, endeavor should be made to expedite the development of all natural resources. "Immigration," using that term in its widest sense, must necessarily be a very important factor in the development of all natural resources, and, in this connection, the monthly review for October, of progress in Canada, published by the department of Colonization and Development of the Canadian Pacific Railway, has something very pertinent to say:

The most frequently recurring word in Canadian economic converse is "immigration." It is continually on the lips of the country's statesmen and legislators; it is to be found every day in the editorial columns of Dominion's journals; business men find in it the mirror which reflects the general trend of commercial affairs. The term suggests the history of Canada's wonderful growth in all respects since Confederation; in all that it signifies lies the Dominion's hope and expectation of a development surpassing even this unprecedented record in the next half century.

Canada's interpretation of the word in her national economic life, however, admits of a wider significance than the entry into the country of foreign peoples, and includes the introduction of foreign capital. In agriculture and the successful settlement of the Dominion's vast, uncultivated tracts of fertile land lies Canada's fundamental of progress and future greatness. There must, however, be a corresponding industrial growth with the development of mineral, forest and other natural resources and expansion in the field of manufacturing. To this end capital is needed and the attraction of this necessary factor in the Dominion's endeavors only to that of increasing the population by inducing an intelligent and assimilable type of settler to the country.

In the general depression to which Canada was subjected in common with other nations implicated in the Great War and which affected most phases of her national life, it was gratifying to note the resumption of the influx of foreign money which had practically ceased with the outbreak of the war and continued whilst hostilities were in progress. The only difference was that British capital which had previously led in the assault on Canada became subservient in its volume to that of the United States, for the very conditions which militated against the transfer of any substantial amounts across the seas made it decidedly advantageous to send money across the border. It was estimated a short while ago that United States capital invested in Canada amounted to about 1,600 millions, or about one half the total British investment in the Dominion.

The value of United States investments in Canada during 1920 is estimated at $32,000,000 made up as follows: new bond issues placed in the United States $235,000,000; other bonds purchased $15,000,000; industrial investments, $50,000,000; Western land investments, $5,000,000; increase in assets of insurance companies, $15,000,000. This constituted a record for United States investment, the figures of 1919 being $200,000,000 and the highest previous figures the $207,000,000 of 1916. It is estimated that these probably yield an annual return of $90,000,000, including as they do some of the Dominion's best paying businesses.

The total number of company incorporations with Dominion charters in 1920 was 991 with a total capitalization of $603,210,850, the greater part of which, without doubt, represents foreign capital. Just how investment in Canada is increasing can be realized from a comparison with the previous year's figures, when there was a total of 512 companies which received Federal charters capitalized at $214,326,000. In addition to the figures above recorded 88 companies, by supplementary letters patent, increased their capital stock by $85,187,750. In considering these figures, too, it should be borne in mind that no account is taken of the host of companies incorporated under the charters of the various provinces, all of which have power to grant charters.

The fact that last year, in a period generally considered depressive and one justifying conservatism of action, Canada practically trebled the incorporated capital stock of the previous year and United States total investments nearly doubled, together with the tendency apparent for English incoming capital to assume greater substantiality of volume despite its many handicaps, is just cause for boundless optimism in the immediate future of Canadian commerce and industry. Indications become more apparent every day of the widespread attraction Canada's resources are exerting and the greater attention devoted to the Dominion as a country for investment. To an ever greater extent the great undeveloped wealth of Canada will draw capital for its exploitation.

ALBERTA TAR SAND AREAS.

A despatch from Winnipeg to the Financial Times, Montreal, reports that oil men from the south are said to be returning to the Athabasca area of northern Alberta and buying an interest in the tar sands of that country.

Some years ago United States people became deeply interested in the tar sands districts of Alberta and spent considerable money in the purchase of desirable locations.

At a later time these investors who were practical oil men, became discouraged, and a syndicate was formed in Winnipeg to take over some of these properties.

At that time a German prospector made a number of trips to Winnipeg and spent a couple of years in and out of the city. His name was Von Hammerstein, and his home is still in the far north of Alberta, his residence being in the village of Lac La Biche on the line of Fort McMurray.

Among those who became interested in the tar sand areas at that time were E. F. Hutchings and W. R. Mulock, K.C. The former is the president of the American Oil and Asphalt Company which is a holding corporation only, and not an operating company, and which holds title to 12,000 acres of the most promising land in the district.

Interest in this proposition was to some extent revived this year owing to the pressing search which has been made for petroleum in the north. Prospectors traversed the country, and sent back interesting accounts of the great potential wealth of the region.

It was recently reported from Edmonton that a syndicate in that city had disposed of their holdings of tar sands to oil men from Texas for the sum of $120,000. The names of the buyers were given as R. W. Campbell and C. B. Hammond. The acreage involved in the sale was given as 1,900. This land is within 2½ miles of Fort McMurray. Before the sale was completed samples of the tar sands were sent to Texas and tested in refineries in which the Texas investors are interested.

Northern Ontario Letter

THE SILVER MINES.

Although the price of commercial bar silver rose to upwards of 73 cents an ounce at the beginning of the third week of October, it eased off during the close of the week to around 70 cents an ounce.

Silver miners, as well as certain metal authorities, are again discussing the possibility of an early upward move to around $1 an ounce. Outstanding among the more optimistic is Senator Key Pittman, author of the Pittman Bill under the terms of which the United States Treasury is purchasing all home-produced silver at 99½ cents per ounce.

Working Forces at Cobalt Increased.

In the Cobalt district, the stronger position of the silver market has resulted in working forces being increased to upwards of 1,000 men, as compared with less than 700 toward the end of the past winter when the price of the metal fell off to a low point of 52 cents an ounce. Business men in the Cobalt district are pointing to the increased pay-roll as an indicator of better business, while there are additional prospects of other mines resuming work not later than next spring. Among these would be the McKinley-Darragh, Beaver Consolidated and Temiskaming, the operation of which would tend to increase the total pay-roll by another 25 percent.

La Rose.

A cave of rock in an open cut on the original property of the La Rose Consolidated has let considerable water flow into the workings. This has caused a suspension of operations on this part of the company's holdings. In the meantime, however, work is being continued as usual on the Violet, University and Princess.

Hudson Bay Mining Co.

There are strong indications that the Hudson Bay Mining Company may interest itself in the Cane Silver Mines, situated in the township of Cane on the Elk Lake branch of the T. and N. O. Railway. Already certain of the directors of the Hudson Bay are involved in the Cane Silver Mines Company and are understood to be very well pleased with the outlook. It is pointed out that the Hudson Bay Mine has about exhausted its resources, and that the plant now on the property could be moved to the Cane property with a minimum of difficulty, if so desired.

Exploring Larder Lake Properties.

The Crown Reserve Mining Company is meeting with a good deal of encouragement in the exploration of property in the Larder Lake district. Early reports in circulation indicated values of about $6 per ton across a width of about 30 feet. Later reports modify these figures, particularly in the case of the average values which are now understood to amount to approximately $5 per ton.

Other companies which have shown interest in the Larder Lake district include the Coniagas Mines, but it is difficult to estimate as yet whether work is to become widespread or not.

Nipissing's Option on Rochester.

It has just been learned that the option held by the Nipissing Mining Company on the Rochester property in the Porcupine district is for $250,000. The company is continuing exploration of the property with a diamond drill. A wide zone of schisted formation occurs, and encouraging mineralization has been encountered. The Rochester lies immediately adjacent to the Hollinger Consolidated on the north-west.

Looking for Cobalt Ore.

The Cobalt district is being investigated carefully by mining men who are looking for commercial deposits of ores of the metal cobalt. As yet, no deals appear to have been closed although a definite proposition has been made to the owners of the Lang-Caswell property in Lorrain. It is believed arrangements may be made to operate this property during the coming winter.

Silver Production Increased.

Silver production from this district amounts to about 800,000 ounces per month. This compares with a low point of around 600,000 ounces per month near the close of last winter when the price of the metal fell off to around 52 cents per ounce.

Right of Way.

The winding up of the affairs of the Right of Way Mines is proceeding, and it has been intimated in official circles that the 2,000,000 shares have practically no value.

Elk Lake.

Apart from the reports that the Hudson Bay Mining Company of Cobalt may interest itself in the Cane Sil-

ver Mines, the mining situation in the Elk district does not present any very favorable aspects, with a few exceptions as in the case of the Downey property at Silver Lake, where considerable work is planned.

The Gowganda Road.

In the construction of the road from Elk Lake to Gowganda, the Ontario Government is paying workmen $3.50 per nine-hour day. Although this is low when compared with around $4.75 at the gold mines and $4 at the silver mines, yet it is high when compared with $25 and $30 per month which is the average rate of pay this fall in the lumber camps.

May Instal Mill this Winter.

It has been learned on good authority that the prospects are favorable for the installation of a small mill during the coming winter on the Castle property of the Trethewey Company. The Castle appears to be second in importance to the Miller Lake-O'Brien in the Gowganda district, and those interested in the field are keenly interested in its development for the reason that success on this property would encourage more widespread activity and would enable other property owners to raise finances with which to carry out warranted exploration and development work.

Bailey Ships Ore.

A shipment of 24,534 pounds of ore has just been made from the Bailey Silver Mines to the Pennsylvania Smelting Company, Carnegie, Pa. This is the second shipment within one month from the Bailey.

Coniagas.

The activities of the Coniagas Mines in the Larder Lake field consists of having a man in the district looking over property in the vicinity of that owned by the Crown Reserve. Capt. John Reddington is in charge of this field work for the Coniagas, and it has just been learned that arrangements are being made to take over a promising mining prospect in that district.

The Coniagas Mine itself continues to produce silver at normal capacity, the plants treating an aggregate of upwards of 600 tons of ore every twenty-four hours. The company will close its fiscal year on Oct. 31st, and will show a production for the year well in advance of the past two or three years.

Working Reliance under Lease.

The Reliance property at Cobalt is being worked under lease, and shipments of ore are being made to the Bailey Customs Mill. The property is known to have an encouraging amount of medium grade ore.

THE GOLD MINES.

Heavy rains continued intermittently during the third week of October throughout the Cobalt, Porcupine and Kirkland Lake districts. As a result of this the swamps are filled to overflowing and the lakes and rivers are gradually rising. This condition means that the seepage into the main waterways will probably continue long after the surface becomes frozen, all of which tends to indicate that the winter may be far advanced before the water level commences to lower.

May Substitute Ball Mills for Stamps.

In spite of the desire of the Hollinger Consolidated to prevent optimistic statements to get abroad with respect to contemplated enlargements to the size of its milling plant and the scope of underground operations, it is being mentioned in well informed circles that another big central shaft is under consideration and will be so designed as to have for its objective the 2000 and possibly the 4000-ft. level. Also, that the present stamp equipment may be entirely replaced by ball mills. At present, there are 200 stamps operating in conjunction with 20 tube mills. The displacement of these 200 stamps by 10 ball mills each of 600 tons daily capacity would increase the total capacity of the mill to approximately 6000 tons of ore daily. Were the company to do this, and continue to realize an income of $10 per ton, the annual income would exceed $21,000,000. It is considered probable, however, that in bidding for such a vast tonnage, the average grade of the whole might be reduced somewhat by the inclusion of a large amount of medium grade ore. Also, that although the maximum capacity might be brought up to 6000 tons daily, yet, after making due allowance for a reasonable amount of lost time, such a plant might be expected to handle about 2,000,000 tons of ore annually. Also, allowing for reduced values to $8 per ton, the annual yield would amount to $16,000,000. Just now the mine is producing at the rate of between $12,000,000 and $13,000,000 a year.

Work Started at Davidson Mine.

Work is being started on the Davidson Consolidated, the company being in strong position as a result of successful financial arrangements having been made in England. From the available reports on the property, the Davidson has a substantial amount of ore and is expected to figure conspicuously in developments in the Porcupine district during the next year or so. It is stated that sufficient money is available with which to finance the construction of a big mill at such time as the management may consider such a plant advisable.

Teck-Hughes.

There is further talk about a possible consolidation of the Teck-Hughes with the Orr Gold Mines. Incidentally, it has been learned officially that a meeting of the bondholders and the stockholders of the Teck-Hughes may be held at an early date for the purpose of arriving at a mutually satisfactory arrangement in respect to the $610,000 owing by the Teck-Hughes Company, this being in the form of $500,000 in bonds and the balance being accrued interest.

Crown Reserve.

In view of the encouragement which the Crown Reserve is meeting with on its property in the Larder Lake field, this belief is now taking form that the entire stretch of 25 miles of territory lying between Kirkland and Larder Lake may be found to contain commercial deposits of ore at intervals. It is learned, however, that the earlier reports about the results on the Crown Reserve were slightly exaggerated, in that the ore assays approximately $5 per ton across about 30 feet instead of around $6 per ton.

The trend of results from one end to the other of this auriferous zone is leading to the belief that the present easterly extension of the road through the Kirkland Lake district will likely be continued right through Lebel and Gauthier townships to the vicinity of the Argonaut Gold property and there link up with the Larder Lake road.

Lake Shore.

During the month of September the Lake Shore mine produced $40,928.74, thereby maintaining its record at the rate of approximately half a million dollars a year in spite of the mill having operated only 90 per cent of the possible running time.

A feature of the monthly achievement was that the ore yielded an average of $25.24 per ton, this being

slightly above normal. Another favorable feature was that of the 10 per cent of the possible running time lost, only 1.4 per cent was due to "power off," the remainder of lost time being due to installing reduction gear and re-lining the ball mill.

The report does not deal as usual with the amount of work done underground and gives no indication of what point exploration or development work is being centered.

Dome Using 2,800 h.p.

It now requires approximately 2,800 hydro-electric horse power to operate the Dome Mines equipment at full capacity, according to official advice. This consumption of power enables the mill to handle between 1,100 and 1,200 tons of ore, on which the monthly income is at present at the fluctuating rate of between $200,000 and $250,000 per month.

Montreal Kirkland.

A meeting of the shareholders of the Montreal Kirkland has been called for November 1st at which the question of raising more money with which to explore the property will be discussed.

In notice of the meeting sent out to the shareholders, as large an attendance as possible is urged.

Teck-Hughes.

A mining man who is in close touch with the Teck-Hughes Mining Company declares that although no date has actually been set upon which to hold a special meeting of the bondholders and stockholders such a meeting will probably be arranged within a reasonably short time. This statement was in reply to questions based upon the recent reports that such a meeeting is under contemplation.

British Columbia Notes

Nelson, B.C.—The production of the Sullivan Mine, Kimberley, B.C., is being reduced temporarily by the Consolidated Mining & Smelting Co. because of the slackness of the zinc market. —The option held on the Van Roi Mine, Silverton, by Clarence Cunningham, has been relinquished. Ore to the value of approximately $350,000 has been shipped by Mr. Cunningham. His option, secured in 1916, was for $225,000. After making some payments on this amount, the owners, owing to metal market conditions, agreed to permit the continuance of operations on a royalty basis.

Gold Find in the Old Cariboo.

Quesnel, B.C.—There is great excitement in the old Cariboo, British Columbia. Gold again has been struck. How important the discovery is cannot be said until more reliable information is received but first reports are favorable and have started a stampede from the Horsefly and Quesnel-Forks Districts. The find is at Cedar Creek on Quesnel Lake, about eight miles up the lake from Quesnel Dam. A few men have been prospecting there for some time and taking out small amounts of gold.

Prospectors Find Lost Channel.

Some weeks ago they started prospecting the upper benches of the creek and apparently struck the old channel that was lost in the early days, at least that is the current belief and no doubt the fervent hope of residents of the district. The original stakers are reported to be taking out $35 a day in coarse gold, some large nuggets being found. Several claims staked up and down the channel from the discovery have proved up similarly. A gas boat service has been started from the mouth of Horsefly River to the claims. Notwithstanding shortage of water it is said that $1,200 in nuggets and coarse gold dust has been taken out in a very short time and the first recorders aver that they have another Klondyke.

Says Mayo the New Eldorado.

Vancouver, B.C.—Frank Lowe, a prominent businessman of Dawson Y. T., who is out for the winter, describes the Mayo District as the new silver Eldorado of the Yukon. There have been handled from the Camp this year 2,500 tons of silver bearing ore and reports from the Tacoma Smelter reaching the north have been that it is the richest ore ever treated there. "At one mine which I visited" Mr. Lowe says, "the silver vein was four feet wide at a depth of 150 feet and I was told by the engineers in charge that the ore got richer as the depth increased. Winter work is in progress here and by Spring it is expected there will be a large quantity of ore bagged and ready for shipment." From lookout Mountain to Mount Cameron, a distance of some thirty miles, the whole of the Mayo country has been staked. The Yukon Gold Company and the Bradley interests both have done considerable work and there are hundreds of small claims being developed. Mr. Lowe thinks it likely that the latter will be absorbed by the bigger financial interests as "the day of the small miner in the north has pretty well passed." Mayo, he says is not like the Klondyke of the early days but is an orderly camp, the inhabitants of which are law abiding and industrious. Of the future of the Yukon Mr. Lowe speaks optimistically but it is his belief that it is to become predominantly a lode gold producing country. He states that gold bearing quartz has been found in several sections and that some of the properties are promising.

High Freight Rates Retarding Development.

Gordon F. Dickson, General Manager of the Blue Diamond Coal Company, Brule, Alberta, considers that high freight rates alone are responsible for retarding the development of the coal resources of the Province of Alberta. With a reduced transportation cost coal could be laid down in Vancouver City cheaper than it is produced on Vancouver Island and sold in the Vancouver market. Alberta coal fields he describes are practically inexhaustible. The Blue Diamond Mine is producing 1,000 tons a day but this could be doubled if freight rates were so graded as to give the coal producer a wider market. Mr. Dickson further says: "American mines are today running almost full blast. This great production allows a cheaper output than in Alberta. Mines in Alberta consequently have strong competition across the border and as a result the great coal fields of Canada lie undeveloped while American mines capture the market. This takes money out of Canada and has a notable effect on the rate of American exchange. Low freight rates would change the whole situation. It would permit Alberta coal to be sent as far east as Ontario where it would undersell American coal."

Ore Receipts at Trail.

Trail, B.C.—Ore receipts in gross tons at the Trail Smelter of the Consolidated Mining & Smelting Co. for the week from October 1 to 7 totalled 7,596. Of this 7,339 tons came from Company properties. Among the independent shippers were the Black Prince, Sloean City; the Castor Fraction, Beaverdell; the Highland Chief, Beaverdell; and the Surprise, Rossbery.

2,000,00 Foot Flow at Pouce Coupé.

The Imperial Oil Company officially announces the

striking of a 2,000,000 foot flow of gas in the Pouce Coupé Field, Province of Alberta, now being prospected. The gas was reached at a depth of 1,650 feet. Drilling commenced last June. At 150 feet the drill encountered oil and gas and since it has passed through a dark marine shale with considerable showing of oil.

A. McQueen, vice-president of the Company, is quoted as saying that drilling will be prosecuted all winter in all of the Alberta Fields now being tested. He asserts that drilling during the next twelve months should reach such a stage as to elicit definite information regarding the oil producing possibilities of all the sections of western Canada now receiving attention.

The Fort Norman Field.

Reports have been received from officials of the Mines Department, Ottawa, who have been in the Fort Norman section of northwestern Canada. They take a middle position in regard to the commercial possibilities of this field—neither overly optimistic nor unduly pessimistic. They say that undoubtedly there is oil in that section, that much of the likely area has not yet been explored, but that production in large quantities is not yet in evidence. While one gusher was struck and poured forth in volume for a time, the run now has fallen to a few barrels a day. Another boring has struck oil at 1,500 feet but only in small quantities. The officials do not condemn the Field nor do they deny its possibilities but on the basis of what has been discovered, they are not enthusiastic, especially in view of the isolation of the territory and transportation and other difficulties.

TORONTO MINING QUOTATIONS.

Quotations on Active Stocks on Standard Stock Exchange on 25th October, 1921.

Silver.	High.	Low.	Last.
Adanac Silver Mines, Ltd.	1	½	¾
Bailey	2¾	2¾	2¾
Beaver Consolidated	25	23½	23½
Coniagas	1.55	1.25	1.25
Crown Reserve	12¾	11½	12
Foster	2	2	2
Gifford	½	½	½
Great Northern	1¼	1¼	1¼
La Rosé	35½	33½	33½
McKin.-Dar.-Savage	22½	19	19
Mining Corp. of Can.	1.13	1.13	1.13
Nipissing	5.95	5.75	5.75
Peterson Lake	12½	10	12
Temiskaming	22	22	22
Trethewey	12	11	11½
Victory	26	25½	26
Gold.			
Atlas	17	12¾	12¾
Dome Extension	70	70	70
Dome Lake	7¾	7½	7½
Dome Mines	20.25	19.25	20.00
Gold Reef	2¼	1½	2
Hollinger Cons.	7.45	7.35	7.45
		× Ex D 1%	
Keora	13¾	11½	13
LaBelle Kirkland M.	35	33	33
Lake Shore M. Ltd	1.25	1.20	1.22
McIntyre	1.92	1.90	1.90
Moneta	9½	9½	9½
Newray Mines, Ltd	5¼	4½	5¼
Porcupine V.N.T.	17½	66	16
Preston East Dome	2½	2	2½
Schumacher	23	23	23
Teck-Hughes	16½	15¼	16½
Thompson Krist	3¼	2	3¼
West Dome	7¼	7¼	7¼
West Tree Mines Ltd.	3.7	3½	3½
Wasapika Gold M. Ltd.	4	3½	3½
Miscellaneous.			
Petrol Oil	20	20	20
Vacuum G.	4¼	2¾	2¾

METAL QUOTATIONS.

Following are the fair average prices for ingot metals (in less than car-loads):

Toronto.	Cents per lb. 25th Oct. (Unchanged since last week).
Copper, Electric	17
Copper, Casting	16¾
Tin	35
Lead	6¾
Zinc	7½
Aluminum	27
Antimony	9

TORONTO COAL PRICES.

Toronto, 25th Oct. As it is now assumed that the threatened railway strike in the United States is unlikely to materialize, it is not possible to quote prices obtaining at the moment. Last week, when the situation looked more serious, coal men in Toronto ordered quite a bit of coal in order to take care of their customers. But the said customers have not shown much alacrity in desiring to avail themselves of this forethought. For example, one firm within the writer's knowledge had some forty or fifty cars ordered, and now, with the strike looking unlikely to occur, it has had about a quarter of this cancelled. As many coal men are apt to have a fair amount of coal left on their hands in this way, it is quite possible that the market will sag a bit. In that case, such prices as obtain will be fixed, more or less, as the result of individual deals.

NIPISSING INCREASING PRODUCTION.

During the month of September, the Nipissing mine produced silver at a greater rate than during any preceding month since away back in 1920. The daily production for September averaged $6,584, and amounted to a total of $197,536 for the period.

In his regular monthly report to the president and directors, Hugh Park, manager, says that—"During the month of September, the company mined ore of an estimated net value of $197,536 and shipped bullion from Nipissing and custom ore of an estimated net value of $164,405. The value of the silver was estimated at 70 cents an ounce, an increase of 7 cents over August."

With respect to development work, it is noted that exceedingly favorable results were achieved, the official statement showing that "Development work on the new vein found at the second level of 63 shaft at the end of August was favorable during September. The vein has been drifted on for 80 feet, of which 60 feet has an average assay of 2,500 ounces over a width of 3 inches. General underground work at all shafts was favorable throughout the month; a few small veins of minor importance were found at 73 shaft.

"The low grade mill treated 6,835 tons. The high grade plant treated only 36 tons, being shut down to await the completion of an acid treatment annex. This is now ready to start.

The Canadian Miners' Buying Directory.

Acetylene Gas:
Canada Carbide Company, Ltd
Prest-O-Lite Co. of Canada, Ltd.

Acetylene Welding:
The Toronto Iron Works, Ltd.

A.C. Units:
Powley & Townsley, Limited.

Agitators:
The Dorr Co
Can. Chicago Bridge & Iron Co., Ltd.
Horton Steel Works, Limited.

Air Compressors:
Belliss & Morcom, Ltd.
Laurie & Lamb

Air Hoists:
Canadian Ingersoll-Rand Co., Ltd
Mussens, Limited.

Air Receivers:
The Toronto Iron Works, Ltd.

Alloy and Carbon Tool Steel:
Peacock Brothers Limited.

Alternators:
MacGovern & Co

Aluminium:
Spielman Agencies, Regd.

Amalgamators:
Northern Canada Supply Co.
Mine and Smelter Supply Co.
Wabi Iron Works.

Antimony:
Canada Metal Co.

Antimonial Lead:
Pennsylvania Smelting Co

Assayers' and Chemists' Supplies:
Dominion Engineering & Inspection Co.
Lymans, Limited
Mine & Smelter Supply Co.
Pennsylvania Smelting Co.
Stanley, W. F. & Co., Ltd.

Ash Conveyors:
Canadian Link-Belt Company

Ashes Handling Machinery:
Canadian Link-Belt Co., Ltd.

Assayers and Chemists:
Milton L. Hersey Co., Ltd
Campbell & Deyell
Ledoux & Co.
Thos. Heys & Son
C. L. Constant Co.

Asbestos:
Everitt & Co.

Balls:
Hull Iron & Steel Foundries, Ltd.
Peacock Brothers Limited.
The Wabi Iron Works.
The Hardinge Conical Mill Co
The William Kennedy & Sons, Ltd.

Ball Mills:
Hardinge Conical Mill Co.
Hull Iron & Steel Foundries, Ltd.
The Wabi Iron Works.
The William Kennedy & Sons, Ltd.

Babbit Metals:
Canada Metal Co.
Hoyt Metal Co.

Ball Mill Feeders:
Hardinge Conical Mill Co.
Hull Iron & Steel Foundries, Ltd

Ball Mill Linings:
Hardinge Conical Mill Co.
The William Kennedy & Sons, Ltd.
Peacock Brothers, Limited
Hull Iron & Steel Foundries, Ltd.

Belting—Leather, Rubber and Cotton:
Canadian Link-Belt Co., Ltd.
The Mine & Smelter Supply Co.
Northern Canada Supply Co.
Jones & Glasco.

Belting:
R. T. Gilman & Co
Gutta Percha & Rubber, Ltd.

Belting—Silent Chain:
Canadian Link-Belt Co., Ltd.
Hans Renold of Canada, Limited, Montreal
Jones & Glassco (Regd.)

Belting (Transmission):
Goodyear Tire & Rubber Co

Belting (Elevator):
Goodyear Tire & Rubber Co

Belting (Conveyor):
Goodyear Tire & Rubber Co
Gutta Percha & Rubber, Ltd.

Bins and Hoppers:
The Toronto Iron Works, Ltd.
Can. Chicago Bridge & Iron Co., Ltd.
Horton Steel Works, Limited.

Blasting Batteries and Supplies:
Canadian Ingersoll-Rand Co., Ltd
Mussens, Ltd.
Canadian Explosives, Ltd.
Powley & Townsley, Limited.

Bluestone:
The Consolidated Mining & Smelting Co
The Coniagas Reduction Co., Ltd.

Blowers:
Canadian Fairbanks-Morse Co., Ltd
Northern Canada Supply Co.

Boilers:
Canadian Ingersoll-Rand Co., Ltd
Marsh Engineering Works
R. T. Gilman & Co.
The John Inglis Company
Wabi Iron Works.

Blue Vitriol (Coniagas Red):
Canadian Fairbanks-Morse Co., Ltd.

Bortz and Carbons:
Diamond Drill Carbon Co.

Boxes, Cable Junction:
Standard Underground Cable Co. of Canada, Ltd.
Northern Electric Co., Ltd.

Brazilian Rough Diamonds:
Diamond Drill Carbon Co.

Brazilian Mica:
Diamond Drill Carbon Co.

Buggies, Mine Car (Steel)
Hendrick Manufacturing Co

Brazilian Ballas:
Diamond Drill Carbon Co.

Brazilian Rock Crystal:
Diamond Drill Carbon Co.

Brazilian Tourmalines:
Diamond Drill Carbon Co.

Brazilian Aquamarines:
Diamond Drill Carbon Co.

Bridges—Man Trolley and Rope Operated—Material Handling
Canadian Mead-Morrison Co., Limited

Bronze, Manganese, Perforated and Plain:
Hendrick Manufacturing Co.

Buckets:
Canadian Ingersoll-Rand Co., Ltd.
R. T. Gilman & Co.
Hendrick Manufacturing Co.
Canadian Link-Belt Co., Ltd.
Marsh Engineering Works
Mussens, Ltd.
MacKinnon Steel Co., Ltd.
Northern Canada Supply Co.
The Wabi Iron Works

Buckets, Elevator:
Canadian Link-Belt Co., Ltd.
Hendrick Mfg. Co.
Peacock Brothers Limited.

Cable—Aerial and Underground:
Canada Wire & Cable Co.
Northern Canada Supply Co.
Standard Underground Cable Co. of Canada, Ltd.
Peacock Brothers, Limited

Cableways:
Canadian Mead-Morrison Co., Limited
Fraser & Chalmers of Canada, Ltd.
Mussens, Ltd.
The Wabi Iron Works
R. T. Gilman & Co.

Cages:
Canadian Ingersoll-Rand Co., Ltd., Montreal, Que
Northern Canada Supply Co.
Fraser & Chalmers of Canada, Ltd
The Electric Steel & Metals Co.
The Mine & Smelter Supply Co.
Mussens, Ltd.
The Wabi Iron Works

"The refinery shipped 252,213 fine ounces of bullion. The following is an estimate of production for the month of September:

Silver production	$172,516
Cobalt	25,020
Total	$197,536

PREPARATION AND STORAGE OF MINE TIMBERS.

Perhaps no phase of mining is given less attention than preparation and storage of mine timbers, yet timber in many mines constitutes one of the principal items of cost, particularly in metal mines. By better preparation and storage of mine timbers the durability and strength may be considerably increased and the consumption decreased, thus reducing mining costs.

Preparation may be considered under two heads—peeling and seasoning. The principal advantage from peeling timbers are (1) lessens weight, (2) increases durability, (3) offers greater resistance to insect and fungus attack, and (4) promotes seasoning.

Peeled timber weighs 6 to 10 per cent less than unpeeled green timber. Therefore, peeling at point of shipment effects a considerable saving in cost of freight. In comparatively dry workings peeling will increase the life of timber appreciably, but in wet places this is not so apparent. In dead timber the space beneath the bark is an ideal breeding place for wood destroying insects, which cause both weakness and rapid decay. Bark also causes the retention of moisture and thus promotes fungus growth.

Seasoning mine timber has the following advantages, (1) increases the strength and in some cases the durability, (2) decreases the weight and thereby reduces cost of freight and handling, (3) protects from insects and decay before the timber is placed in service, and (4) makes the timber more easily susceptible to preservative treatment.

Records of actual tests show that thoroughly seasoned timber may be from 25 to 50 per cent stronger than green timber of similar varieties. Under some conditions seasoning increases the durability, but in general seasoning without preservative treatment does not add greatly to the life. Like peeling, seasoning decreases the weight of timber and thus saves freight and cost of handling. Experiments by the Forest Products Laboratory, Madison, Wisconsin, have shown that round mine timbers up to 11 inches in diameter air-seasoned 3 months, lost 15 to 25 per cent of their original green weight, depending upon the size and variety of the timber. In general, mine timbers may be sufficiently air seasoned for most purposes in 3 to 6 months, depending upon the weather, locality, and variety of timber. Timber that is to be treated must be seasoned, as the preservative fluid cannot be injected until at least a part of the water which green timber contains is expelled.

Usually timber storage does not receive the attention that it deserves. Proper storage is essential for proper seasoning, also for preventing checking and initial decay before placing the timbers in service. Timber yards should be well drained and free from vegetation and decaying wood. Timber should be placed on supports at least 12 inches from the ground, and should be so piled that air can circulate freely.—U.S. Bureau of Mines.

WILL MEET IN TORONTO.

The seventy-fourth meeting of the American Association for the Advancement of Science and of the Associated Societies will be held in Toronto, Dec. 27-31. The engineering and geological sections will have addresses and discussions of interest to mining engineers. Mr. J. B. Tyrrell and Dr. W. G. Miller of Toronto will preside at the sectional meetings devoted to engineering and geology.

Through its meetings and through its publications, the American Association promotes intercourse and cooperation and the feeling of fellowship among scientists and those interested in the advance of science and education. North America and South America are its its special geographic fields, but members may be citizens of any country. The Association has become a great affiliation of American scientific societies, and its meetings have become increasingly characterized as conventions of many special organizations. A large number of the associated societies regularly meet with it and the facilities of the Association are always at the disposal of these societies, for the arrangement of meetings, the preparation of programs, etc. Many associated societies are also officially affiliated and are represented in the Council of the Association, thus taking part in its direction.

Work has been resumed at the Coalmont Coal Company's Mine, Nicola Princeton District. The plant has been idle for a fortnight.

EDITORIAL

GOVERNMENT INACTION DELAYING PROGRESS.

The delay in granting rights to Hollinger Consolidated Mines Ltd., which will permit the company to go ahead with its plans for increasing development and production, is arousing considerable comment.

That an effort to carry out plans which mean so much to Ontario should be defeated by the failure of the Government to rise to the occasion is deplorable. It is surprising that so little has been done to facilitate the carrying out of this projected industrial expansion, especially when it comes at a time when few concerns are able to finance projects that will help to reduce unemployment and increase production. At this very time conferences are being held everywhere to consider plans for doing the very thing which Hollinger is prepared to do, and yet finds it so difficult to do, because of the apparent inability of the Ontario Government to act in a reasonable time.

There may be some conflict of interest that makes careful consideration of such plans necessary, but there is no known satisfactory explanation of the Government's inability to act. Difficulties may sometimes be given as causes for delay in reaching a decision when a serious effort is being made to get somewhere, but they cannot be accepted as excuses for lack of effort to get there. Lack of effort may be the result of lack of appreciation of what Hollinger's proposal means for Northern Ontario, but it is hardly reasonable to assume that any Government does not appreciate the desirability of developing natural resources, nor can any Government of Ontario long remain ignorant of the fact that the gold mining industry is one of the most desirable industries in Ontario and that the busiest communities in the Province to-day are the centres of gold production.

If the Government is, with full appreciation of the situation, delaying action for reasons unknown to the public, it may be acting wisely, but, in fairness to the mining industry, and to the people of Ontario, there should be some explanation of the Government's behaviour in this matter. It is difficult to believe that the Government is desirous of preventing the growth of the mining industry, and we are rather inclined to believe that it really wishes to hasten, rather than retard, progress, but we are quite unable to understand why the Government should fail to act on the proposal of the Hollinger company which calls for utilization of water power for the development of this great gold mine.

SOME PERTINENT QUESTIONS.

The Ontario Government has, during the past year, shown some endeavor to meet the needs of the mining industry in minor matters, but it has not yet shown signs of understanding big affairs of the industry. It has for several months practically ignored a proposition which is the biggest which has been made in the history of gold mining in Ontario. By failure to act in a manner which might reasonably be expected of it, the Government has obstructed a great plan for water power development which would make possible a very large increase of gold production, which would give employment to a large number of men and hasten development of a district into which the Government has already announced that it will build a railway.

If the expected action had been taken by the Government, the work of developing 15,000 h.p. on the Abitibi river would now be well under way. Instead, we enter the winter season with very little done to relieve the power situation. The mining companies will be lucky if they do not have to curtail operations this winter, and their plans for expansion are again held up.

Under the circumstances we are not surprised to see in the "Porcupine Advance", which is published in Ontario's greatest gold mining centre, the following pertinent questions:

"Does the Ontario Government wish to see the North Land develop and progress? Does the Government desire the expansion of North Land industries, with the consequent prosperity and progress that will ensue, benefitting and enriching the south as well as the North? Does the Government desire a very material assistance, without the expenditure of a cent of public money, in the solving at least of part of the pressing unemployment problem now facing the Province? If the Government desires these things, is the Government ready to take the necessary action to assist in securing these desired advantages, especially when the Province may do all this without loss or cost?

"Is it not a fact that the Hollinger Consolidated Gold Mines applied for the right to develop power on the Abitibi River, and that without the power thus planned to be developed, is it not a fact that the Big Mine is handicapped in expanding its great industry?

"Is it not a fact that the Hollinger is ready to make noteworthy additions to its equipment and output, and add many more men to its staffs, just as soon as it has the right assurance of that very necessary ample power for the enlarged needs? Is it not a fact that the Hollinger stood ready to develop its own power at its own cost to meet its own needs? Is it not a fact that the Hollinger was ready to do that same right away, and be ready to deliver power to its own mine early in 1922?

"Was not the Hollinger ready in this connection to push the work with the greatest despatch and energy, giving employment to over 2000 men at once? Was the Hollinger not ready to expend no less than $3,000,000.00 in less than a year to provide this boon to the progress of the North Land? Is not the employment of 2,000 men and the expenditure of $3,000,000.00 of private capital very desirable at the present time? And did not the Government neglect or delay to give the Hollinger Consolidated the necessary rights in this matter of power development?

"Is it answered that it is desired to reserve this power for the T. & N. O. Commission? Then, is it not a fact that there is sufficient water power available north of here for both the T. & N. O. and the Hollinger? And is it not a fact that even if the purpose is to sell surplus power, after the electrification of the T. & N. O. is provided for, the T. & N. O. will not be ready to supply power for three or four years at least, while the Hollinger would be ready to help the progress of the country in this way in a few months? Are the industries of the North Land to wait on the convenience of the T. & N. O. without necessity or due and sufficient reason?

"Will the Government stand thus in the way of the expansion and development of this part of the North Land? Or will Premier Drury and his Cabinet find a way and a means to help this country and its industries, not to hinder?

"In view of the striking benefit in the way of employment, in view of the large outlay of private money ready for this important development, can not the Government do something, and do it quickly, to show that it is ready to encourage and support a plan that promises great assistance in the development and expansion of this part of the North Land?"

RAILWAY COMMISSION AND POWER DEVELOPMENT.

It has been rumored that the water power which the Hollinger company applied for has been reserved by the Government for the T. & N. O. Railway Commission. Enquiry at the Department of Lands gives no confirmation of this rumor.

It seems scarcely possible that the Ontario Government will turn down the proposal of the Hollinger company in order to hold the rights to power until such time as the Railway Commission may develop it. Apart from the fact that the Commission has no present need for the power, and no funds for developing water power, if it did undertake such a proposition, there is the Governmental reply to those who asked that the Commission build railway extensions to serve mining districts. If the Government is unable to find money for the extension of its lines to serve the mining districts tributary to it, it is not likely to find money to permit the Commission to embark in power development schemes.

To hold for the Railway Commission rights to develop the water power applied for by the Hollinger company, would greatly delay the development of Northern Ontario, and it is hardly likely that the Government would take active steps to prevent development. The Government has failed to act to aid progress; but it is hardly believable that it would endeavor to make progress impossible. The present situation seems to be the result of lack of effort on the part of the Government, rather than the result of deliberate planning to retard development.

BRITANNIA BEACH.

Reports of the disaster at Britannia Beach indicate that thirty-six persons lost their lives when the little mining town was flooded. Heavy rains made a large body of water above a railway fill, which gave way under the pressure, and resulted in such a rapid flood that escape from the waters was very difficult. The people of the community have had a terrible experience and the survivors have the sympathy of the whole country.

Britannia Beach is one of the two townsites established by the Britannia Mining and Smelting Co. near the Britannia mine. The Mine Townsite is at the mine entrance, while Britanna Beach is on the shore of Howe Sound. There is a large company store and several smaller buildings on the Beach townsite.

The Britannia mine is one of Canada's biggest copper mines. It has been a large producer, and has, in recent years, been extensively developed. It is equipped

with a mill of 2,500 tons daily capacity. The company has developed 8,000 h. p. on Britannia creek, and has also at the Beach a steam turbine plant of over 3,000 horse power.

The Britannia Mining and Smelting Company, Ltd., is controlled by the Howe Sound Co., of New York, which owns all the stock. The development of the property to its present position has been largely the work of Mr. G. B. Schley and his associates.

POWER REQUIREMENTS AT PORCUPINE.

On another page, our Cobalt correspondent, Mr. J. A. McRae, makes an appeal for co-operation to prevent restricted operation of gold mines in the Porcupine field. Mr. McRae is apparently of the opinion that the threatened power shortage arises from lack of knowledge of the requirements of the gold mines operating in the Porcupine district. It may be true that the exact amount of power required cannot be predicted; but it has been well known for many months that much more power than is now available could be advantageously used this winter, and that much additional power will be required to carry out the announced plans of the mining companies.

Hollinger Consolidated Mines, Ltd., has made no secret of the fact that it will require much more power than it can now obtain. The company's announced intention was to proceed this year with the development of water power on the Abitibi river. The failure to get ahead with the project has resulted from the surprising delay of the Ontario Government in making development possible. All power now available is being used, and plans for increasing production are held up owing to this fact. There is even some doubt as to whether the present supply of power can be maintained during the winter.

It should not be difficult for anyone to obtain some idea of the probable requirements of the operating gold mines. Close figures of the amount used now, and of what is wanted for next year, could be easily obtained. Less exact, but still reasonably approximate, figures for the next few years could be estimated. The Hollinger has proposed to develop for its own use 15,000 h. p. The McIntyre has announced its intention to increase capacity when power is available. The present requirements of the Dome are known. The amounts wanted by other companies can only be guessed at; but are relatively small.

EDITORIAL NOTES.

According to reports from Sudbury there is a growing interest in the possibility of making gold mines in the Shiningtree area. Investigation and development of two properties is reported to have been arranged for.

The report of M. E. Wilson on the Madoc fluorspar industry is a contribution which we have abstracted for readers of the Journal. The district is likely to receive more attention when the iron industry picks up again. Fluorspar was in good demand during the period of munitions making and resulted in drawing attention to the fact that sources of supply are not numerous.

Hollinger is bending every effort to increase production; but cannot get far beyond 4,000 tons per day without more power.

The railroads of the United States in three months carried 220 million tons freight. Of this mineral products constituted 124 million tons. As the "Engineering and Mining Journal" remarks, these mineral products go into a multitude of industries, supplying raw materials for manufacture and supplying energy to do the work.

Mining men are scarce in Parliament. We are pleased to learn, therefore, that Col. T. J. Cantley is a candidate for election in Pictou County, Nova Scotia.

Many Canadians will learn with regret of the death of Dr. Joseph William Richards. He took a prominent part in the teaching of metallurgy in the United States.

ACCIDENTS IN COAL MINES.

According to reports received by the United States Bureau of Mines from the various state mine inspectors, 152 men were killed during September in and about the coal mines of the country, as compared with 197 killed in the corresponding month in 1920. The 1921 figures show a decrease of 45 fatalities, or about 23 per cent, from the record of the same month of last year. Based upon an estimated output of 42,229,000 short tons in September, 1921, the fatality rate is 3.60 per million tons produced. The corresponding rate for September last year was 3.66 and the production of coal was 53,810,000. The production of coal during September, 1921, represents a decrease of 22 per cent.

The average number of lives lost during September of each year from 1913 to 1920 has been 189. The production of coal has averaged 51,886,000 tons, showing a fatality rate of 3.64 per million tons as representative of the month of September for the past eight years.

During the first nine months of the present year, 1,455 men have been killed by accidents at coal mines, against 1,686 killed during the corresponding months of 1920, a decrease of 231 fatalities, or 14 per cent. The output of coal for the same months was 362,800,000 short tons in 1921 and 473,100,000 tons in 1920, a decrease during the present year of 110,300,000 tons, or 23 per cent. These figures represent a fatality rate of 4.01 per million tons mined in 1920.

Of the total of 152 fatalities during September, 30 occurred at the bituminous coal mines in Pennsylvania, a decrease of 15 from September a year ago; 25 in West Virginia, a decrease of 6; 14 in Illinois, a reduction of 3; 6 in Kentucky, a reduction of 8; 5 in Ohio, a reduction of 13; 5 in Alabama, a reduction of 4; 3 in Indiana, a reduction of 12. At the anthracite mines in Pennsylvania, 41 men were killed, as against 20 during September of last year.

The Disaster to Britannia Beach.

A Large Part of This Mining Town was Destroyed Last Friday By Flood.

The whole country has been thrilled with horror at the disaster which overtook the mining town of Britannia Beach on Howe Sound, B.C., last Friday, when a large part of the town was practically obliterated by a flood. It appears that the flood came after seven or ten days' heavy rain, accompanied by snow in the higher altitudes. The warm weather accompanying the precipitation caused the rapid melting of the snow on the mountain-top and a consequent aggravation of the swollen creeks and streams.

The great disaster was not known until the next day. The Britannia settlement has communication with the outside world over its own telephone wires, and these are rarely used at night. Their destruction passed unnoticed, and the disaster which caused the deaths of at least three dozen people was unknown until straggling boats brought the news Saturday morning. The town, which is devoted to the milling of copper ore, will not recover from the disaster perhaps for several months. The damage in the Fraser Valley just east of Vancouver, which was simultaneously flooded is less serious, and on Monday people were returning to their flooded homes in the village of Port Coquitlam, and railways were quickly repaired with a view to the resumption of traffic.

At the moment of writing, it appears that the dead number thirty-six, including several children. Further, many were seriously injured, while a still larger number received injuries more or less slight. Despite the serious injuries of some, it is thought that all will recover. Ten of the dead and all of the injured were brought to Vancouver last Saturday evening on the steamer Capitano. Ambulances were waiting, and the injured were rushed to hospitals, while the bodies were taken to the Morgue to await decision as to an inquest. The search for the missing was continued, but the work is necessarily slow because of the difficulty in clearing away the wreckage in the sea of mud and water. It is doubtful if some of the bodies of the missing will ever be recovered from the muddy waters of Howe Sound.

Manager J. Donahue, of the Britannia Mines, described the efforts made by those on duty at the mines proper, three miles back from the beach, to warn the village. When the railway fill, which caused the accumulation of water in the hills, gave way and released a roaring torrent into the creek, urgent warning was sent out over the mines' telephone.

Before the warning could be understood and passed on to all the residents the waters crashed down the mountainside, swept away transmission lines and plunged the village into darkness. The creek bed, which once carried a veritable river, cut through the centre of the settlement. The arrival of the torrent at sea level meant that everything in its path was carried toward the sea. The water had fallen 2,000 feet in its three-mile journey and gained a momentum which the little houses of Britannia could not resist. On Sunday a broad stream divided the untouched fringes of the town, strewn with timbers, poles, twisted telephone wires and scraps of heavier furniture. Britannia Creek now runs through the village itself. The waters will have to be diverted to their former course by dynamiting. Surveyors say that the worst part of the disaster was the crying of the injured or bewildered villagers.

The flood came up on a community confused by the sudden darkness, caused when the transmission lines failed and a torrential rain fell. The houses for the most part were without foundation, and yielded readily to the surge of the flood. One man hurried with his wife to the attic when he found the water about his doorstep. By the time he could climb on to the roof his house was already out to sea, bobbing about in the rain-swept waters of Howe Sound. Two occupants were rescued finally in a launch.

Other houses were crushed to pulpwood when they were caught between some obstacles and the rushing water. Many were injured by falling timbers. Some of these owe their lives to the efforts of rescuers who toiled throughout the night in and out of the maze of floating houses, guided to those in distress by cries and warnings. Candles and pit lamps were of little use in this work. Two children were found asleep in their beds, unhurt, hours after their mother and two brothers had been swept away with a damaged portion of their home.

Fourteen bodies, out of the known list of thirty-six dead, had been recovered by noon of last Monday, and, at the moment of writing, it is stated that, although heavy rain has caused a considerable rise in the water, the workers are making good progress in uncovering wreckage. The flood seems to have descended upon the inhabitants so suddenly that many found their homes actually floating and tossing upon the turbulent torrent ere they realized that anything was amiss.

Three miles back in tthe hills, near the mines proper, a railroad "fill" was being watched night and day for the possibility of a flood. Incessant rains, melting snows from the high levels, and swollen streams which ordinarily trickled harmlessly seawards had deposited a veritable lake of water on the shoulder of the mountain. When darkness fell watchmen reported that there appeared to be no immediate danger of an overflow. Suddenly at 9.30 o'clock the rough dam of timbers, holding back the swollen pocket of water, went out, and the huge mass was released to tumble 2,000 feet down the mountainside upon the settlement below.

One sentry, Jim Emmett, was caught in the swirl as he ran to give warning. The first man to hear his shouts and join in his mission was W. London, who also was washed away. A third managed to reach the mine and telephone a frantic warning to the village exchange. From this telephone the operator, a girl, managed to send out a warning to many residents, and she continued to call her message of terror through the transmitter until the exchange was cut off and she heard the lap of the water against her office door. Then she escaped to the security of the upper floors of the compressor plant. Meantime a wall of water was rushing to the sea. Before the citizens could properly grasp the danger the water was upon them, having found its natural outlet through a long dried-up creek bed which cuts straight through the residental part of the town

CO-OPERATION NECESSARY TO PREVENT RESTRICTED OPERATION OF GOLD MINES IN THE PORCUPINE FIELD.

(By J. A. McRAE).

In the Porcupine district there is an unfortunate situation existing as between the mining companies and the concern which is supplying hydro-electric energy with which to do the operating.

In the past, there has been considerable loss sustained due to an insufficient amount of power, particularly during last winter, as well as in 1915. The shortage during last winter was due to an abnormally dry summer and fall in 1920, and was a condition against which it would have been impossible to make full provision.

This year, the Northern Canada Power Company took the additional precaution of erecting a new dam which is intended to raise the water about ten feet in Kenogamissee Lake, and thereby create a big water-storage basin upon which to draw during coming winter when the lakes and rivers become tightly ice-bound. But, there is general fear among the mining companies that even this precaution may prove to be insufficient, all of which tends to cause uncertainty in the minds of owners of newer properties as to whether it would be advisable to attempt operations and run the risk of being hampered by power shortage.

Officials of the power company previously authorized the Northern Ontario representative of the Canadian Mining Journal to state that the company is not apprehensive about the power supply, but, at the same time, should the mining companies feel otherwise, the power company would welcome suggestions from the mining concerns in respect to their probable requirements and the extent toward which they are willing to co-operate with the power company in connection with taking desired additional measures to provide energy in such volume as to satisfy all concerned. That is to say, that if the mining companies will offer some idea of the amount of power they will require and will agree to take their full requrements from the Northern Canada Power Company, that concern stands prepared to proceed with additional development.

Certain factors which have had a tendency to cause intensified uncertainty are statements from the Hollinger Consolidated and the McIntyre Porcupine that they have each secured rights to develop hydro-electric energy on their own account. In the face of these statements, and in the absence of reasonable assurance from the mining companies that they will use the power coming from further development on the part of the Northern Canada Power Company, the latter concern is obviously afraid to launch out into heavy additional expenditure, when, in doing so, they might find themselves confronted with a lessened demand due to development of energy by one or another of the big mining companies.

It appears as though a considerable amount of new power will be required, indeed such is a certainty at such times as the Porcupine V. N. T. Mines, the Schumacher and West Dome decide to resume operations. This being so, it is obvious that either the mining companies must be prepared to place their requirements squarely before the power company with an offer of reasonable co-operation—either that or to at once undertake power development on their own account.

The general improvement in the economic situation, and the rising tide of interest in gold mining has encouraged the belief that in addition to the present operating mines, there will be a general broadening out and a big increase in the demand for hydro-electric energy. This being so, it behooves all those concerned to bend their energies toward co-operation and thereby relieve the menace of restricted development which at present hangs like a wet blanket over a rising wave of enthusiasm which will make those gold fields of leading world importance provided the requisite encouragement is offered.

DOME FINANCIAL STATEMENT.

A six months' financial statement issued by the Dome Mines Company, Ltd., show earnings before the deduction of depreciation and depletion charges of $432,137, to which is added other income of $81,725, making total earnings of $513,863. This compares with net operating earnings for the full year ending March 31 of $706,894, but shortage of power and other difficulties had to be dealt with during the year. The balance sheet shows a much improved position and that the period under review was a satisfactory one is apparent.

Total assets of the company are now given as $7,485,- amounting to $300,000. Inventories are placed at $275,- 352, as compared with $7,229,977 at the end of the fiscal year. Cash on hand amounts $190,737, as against $356,- 695. The company owns government and other bonds to the value of over $1,000,000 and has loans on call 542. The profit and loss statement shows the sum of 369,712 reserved for depreciation of plant and exhaustion of mine, as well as Dominion of Canada taxes, which leaves profits of $144,151 transferred to the balance sheet.

In the liabilities, there is capital stock outstanding of $4,766,670, reserves for plant depreciation and mine exhaustion are given at $2,396,041, while the reserves for operating equalization are $25,910. A surplus of $3,041 is shown after regular dividends were paid.

SYNDICATE BUYS KINGSTON MINE.

According to a despatch from Sudbury, Ont., appearing in the Toronto Globe, an English syndicate, who have purchased outright the Kingston property, owned by J. J. and W. R. Knox, Orillia, and Sam Cochrane, Sudbury. A half cash payment was made.

There are three lots in the group of claims, situated a half mile east of the White Rock. The sale to the English syndicate is said to be the biggest yet made in connection with a West Shining Tree property, an amount exceeding $150,000 being involved.

The sale of the claims is confirmed by Mining Recorder Campbell, Sudbury, but the transfer of the leases was made to private individuals acting on behalf have had engineers on the ground for several weeks, of the purchasers. Heads of the English syndicate are now in Toronto and plan coming north this week for a visit to the property, according to their representative here.

There has been considerable work done at Shining Tree this summer and showings in some cases are even more sensational than those of Porcupine's early days, particularly in regard to extent of ore bodies. The Mond Nickel Co. has also invaded the field.

Hardinge Company Publishes a New Catalogue on Pulverized Fuels

A Bulletin entitled "Pulverized Fuels" has just been published by the Hardinge Company. This Bulletin is known as their No. 9 Catalogue. The adoption of the Hardinge Mill for pulverized fuels is comparatively recent according to their own statement, as follows:—"The Hardinge Conical Mill, although only recently applied to this field, has been fully demonstrated as a most satisfactory unit for pulverizing solid fuels. The results obtained are a continuation of the remarkable record of the Hardinge Mill in the mining and industrial grinding fields, as evidenced by the fact that over 70,000,000 tons of friable materials are being ground per year in Hardinge Mills alone."

This Bulletin is divided into three main sections, viz., the application of pulverized fuel to various burning problems, the principle of operation of the Hardinge Mill, and a discussion of the application of the Hardinge System for pulverizing fuels. Under the heading of "Pulverized Fuel", three principal causes are mentioned why the advance of this class of fuel has been so rapid in the last few years. These reasons are:

a—The increased efficiency of combustion.

b—The utilization of fuels which would otherwise be wasted or be very inefficiently burned.

c—Flexibility of operation and ease in handling, making it possible to control the burning within a wide range on short notice.

In the general discussion of pulverized fuel where the Hardinge System is used, emphasis is laid upon the point of "sparking" during the burning process. They emphasize the point that when coarse oversize of from 65 to 150 mesh, depending upon the character of fuel, is eliminated, "sparking" ceases, and when this oversize is eliminated by a satisfactory means, it is not necessary to grind to a degree of fineness which was at one time thought necessary.

Under the subject "The Hardinge Mill," the general principle of grinding is discussed, with special reference to stage reduction, elimination of the fine particles as soon as produced, and the proportioning of energy to the work required. The different types of Hardinge Mills and the details of their construction are also discussed in this section, and special reference is made to the advantages of the conical mill when used for pulverized fuels of widely different character.

Under "Pulverized Fuel Installations," a complete pulverized fuel plant is outlined, which includes the feeding of the coal from the track hopper to the crusher, dryer, mill, separator, and distribution system. There is also taken up different arrangements of the mill and separator which would be used according to the special requirements. In addition, there is given a table showing the general dimensions of the different sizes of Hardinge Mills, so that it is possible to make a rough estimate of the floor space required for each unit.

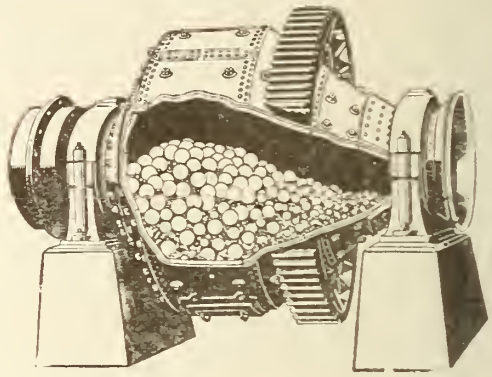
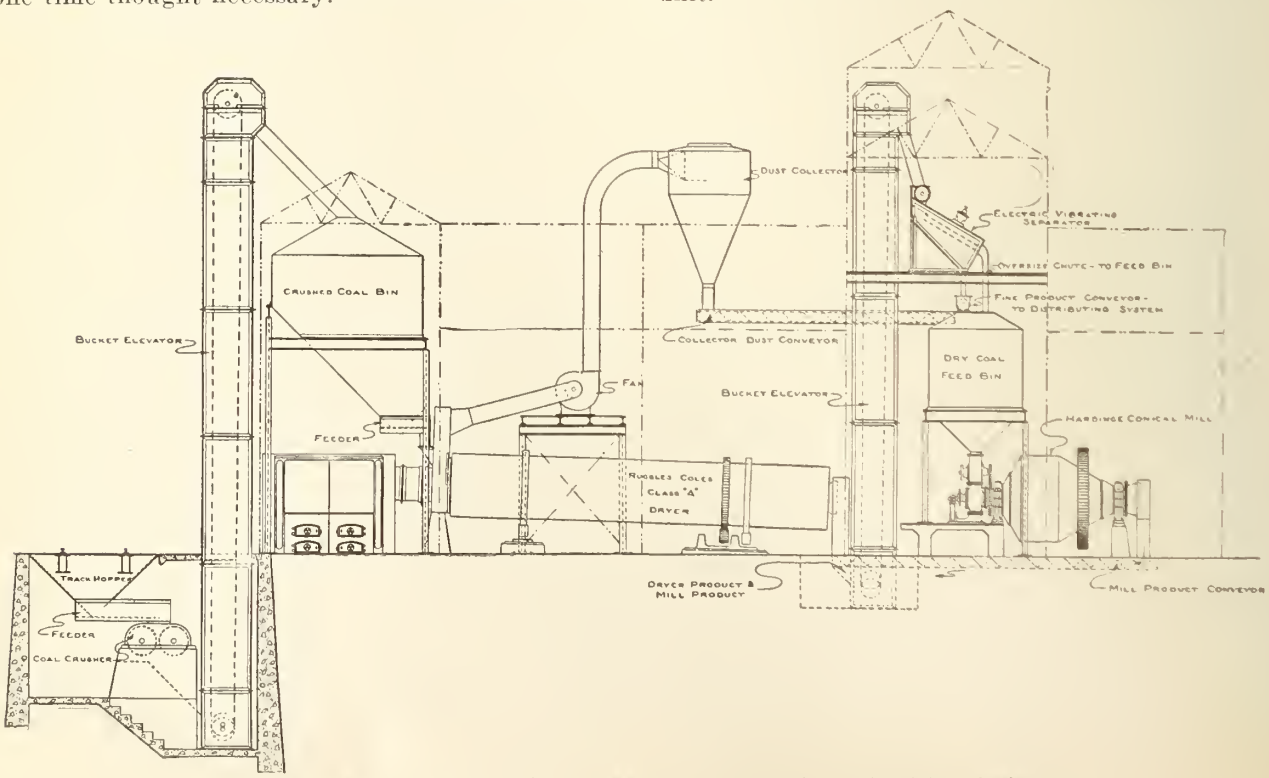


Illustration of the manner in which balls segregate during the operation of the Hardinge Conical Mill.



Typical plant layout, embodying Hardinge System for pulverizing fuels.

The Position of the Kent (Eng.) Coalfield

By ROLAND H. BRIGGS.

No problems in the coalfields of the Old World are of greater interest than those surrounding the finding of Kent coal. Even the international and political questions which are shaking the very foundations of European nations, the coal strike, the effect of the reparations coal paid from Germany under the treaty, and other vital problems, cannot reduce the interest which is being taken in both England and France in the subject of Kent coal.

This famous area of apple blossom and trailing hops, the "Garden of England," where one seems further removed than perhaps anywhere else in the world from the bustle, smoke and crowded populations of great industrial districts, may again soon be awakened to commercial life, as one of the great coal, iron and steel producing areas of Europe.

The iron industry of England was once centred in the south of England in the most rural districts of Sussex and Kent, when iron smelting was done by charcoal, and it will be strange if this industry is re-opened so many generations later in its ancient home.

The value of the Kent coal to England, and especially to London, may be almost limitless. It is only half the distance from London of the other nearest coalfields, and only one-third of the distance from the larger ones. It is claimed that the existing borings have proved its area to exceed two hundred square miles, and that the borings, some of which approach 4,000 feet in depth, have shown that in this proved area there is estimated to be from six to ten thousand million tons of coal.

The seams range in thickness from about 2 to over 13 feet in thickness, and the working of the coal does not exceed in difficulty that of other places where it is satisfactorily exploited. Coals of various classes are found, but the bulk of the coal proved is a soft steam-coal with excellent coking qualities.

Deduced From Geological Reasoning.

The finding of Kent coal was a remarkable scientific achievement. Its presence was deduced from pure geological reasoning, and some years afterwards its existence was proved by the bore-hole put down by Sir Edward Watkin near Dover. Many borings have been sunk since that day and various collieries started. The importance of the coalfield, if of sufficient size, was so obvious to the public that a great deal of speculation has taken place in the coal concerns themselves, and iron, steel and railway companies likely to be favourably affected. The various companies passed through many vicissitudes, and at least once the Kent coalfield was announced in the Press to be dead and finished.

There have, however, always been men with sufficient faith in this coalfield to back their opinions with hard cash, and as a result during and since the war, the coalfield has become a regular producer, and while it may not have fulfilled the anticipations of its earliest promoters, it is nevertheless adding a steady 10,000 tons or so per week to the British coal supply. In the Government Report on Mines and Quarries issued in 1920 the number of coal mines working in Kent is given as seven, and the number of work people employed in these mines above and below ground as 1,954, an increase of fifty per cent on the numbers employed in 1919 as compared with 1918, but the output for 1919 was only 277,829 tons.

Tilmanstone, Chislet and Snowdon.

The most productive colliery up to date has been the Tilmanstone Colliery, about six miles due north of Dover, over half a million tons having been raised from this colliery during the six years including the War, namely 1913 to 1918. The output of Tilmanstone for some considerable time now has been near 4,000 tons per week, and in one week last December the output reached 4,609 tons.

The great expectations with regard to the coal output of the Shakespeare Cliff near Dover have not been fulfilled, but the finding of iron ore there may provide sufficient compensation. The two most important collieries next to Tilmanstone are the Snowdon Colliery and the Chislet Colliery. The output of these three collieries reached about 10,000 ton in July 1920, and since that time it has tended to slightly increase. A steady trade in bunker coal has been built up at Dover, which has sometimes accounted for as much as 3,000 tons of the Kent output.

In November 1920 additional light-railway schemes were authorized, to increase the facilities which had already been arranged for delivering the coal, and in March 1921 a development company has purchased from the Government the war port of Richborough, at Sandwich Haven, and has given an undertaking to maintain it for at least five years. It is stated that the company have made the purchase under the belief that the port will have a great future as one of the principal outlets of the Kent coal-trade and kindred industries which may be expected to spring up in its neighbourhood.

Good Plant and Equipment.

It is therefore clear that the Kent coalfield may at last be regarded as having passed through its experimental stages and having reached the period of regular production. Great difficulties have been faced and overcome, especially those connected with the large amount of water which has been met with. The plant and equipment of the collieries is of the most up-to-date and economical type, as for example that at the Chislet, which has fine horizontal cross-compound non condensing winding engines with drop steam-valves and Corliss exhaust-valves using super-heated steam. The cylinders are 2 ft. 8 in. and 4 ft. 5 in. in diameter, and the stroke in both cases is 5 ft. 6 in. The steam passes from the high-pressure cylinder through a reheater, heated with live steam to the low-pressure cylinder, and the steam retained in this receiver enables the engine to be started from any position, without live steam being admitted to the low-pressure cylinder. Each of these engines is designed to raise four tons of coal from a vertical shaft 1,500 feet in depth in 40 seconds. The electrical and compressed-air equipment is also of the most modern and efficient character.

With the certainty that coal is present in large quantities, that the difficulties of mining it are not insurmountable, that there is a ready market for the output, and that the collieries are being handled efficiently and equipped in an up to date manner, the Kent coal industry may now be regarded as an accomplished fact and its future as definitely assured.

CRUSHING GOLD ORE ON THE RAND.

Messrs. G. A. Denny and H. S. Denny discuss in the Oct. 15 number of the "Mining Journal," London, methods of crushing gold ore on the Rand. They argue that the stamp mill should no longer be used for crushing ore. After giving an account of the results obtained in different types of crushing plants, they say: "the extraordinary thing is that in the face of such facts and records, the policy of stamp milling has even been considered of late years."

"Before the introduction of the tube mill in 1905, the battery screens varied in mesh from 400 to 1,000 holes to the square inch. After the advent of the tube mill the battery screens were gradually coarsened, until finally a coarseness of four holes to the square inch was reached. At the same time a tendency to crush the rock finer in the preliminary stages developed until nothing much above 2-in. cubes was fed to the mill bins. The effect of these alterations in reducing the size of the rock fed to the mill and increasing the size of the product taken from the mill was naturally to increase the quantity of ore passed through the mill, and where 5/6 tons per stamp per day with 1,200-lb. stamps was a normal output, it was increased steadily up to 10/15 tons. Further alterations were made by increasing the weight of the stamps, and at the East Rand Proprietary Mines it is stated that with 1,600/1,800-lb. stamps the output per stamp reached 26 tons per day. The development of independent crushing machines and grinding machines naturally led to comparisons in efficiency between them and the stamp mill, as the result of which a number of plants in different parts of the world were laid down which did not include gravity stamps in the scheme at all. The crusher, on the one side, overlapped the province of the stamp mill in reducing rock down to about ¾-in. mesh, and the tube mill and independently operated grinders made inroads into the field of the stamp mill on the other side by gradually taking a feed up to ¾-in. mesh or more, so that the position of the stamp mill became untenable. There are two fundamental reasons for the crusher development, these being: (1) That the frictional losses in the crusher are only a small percentage of the power which it can usefully employ; and (2) it has a positive discharge for its finished product.

"For the tube mill or other equally efficient fine grinding machine, the favourable features are continuous action, partly percussive and partly triturative, with positive discharge without screens for the final product. The stamp mill, therefore, has been ousted from the field by the perfection of these other machines, each of which has its own scope, and the stamp mill must be regarded as an hybrid instrument that fails to fulfill the functions of either the crusher or the grinder."

"Little has been said of the crusher, of which there are many forms, and amongst which may be mentioned the "Blake" type of jaw crusher and the "Gates" type of gyrator crusher. There are many modifications of the principles on which these two machines are designed, and for breaking rock they have the advantage over the stamp mill, that they have a positive clearance for the finished product, and the power absorbed is proportionate to the actual work done. They can be operated to reduce the ore in two stages, from 12 ins. to ¾ in., so that through their medium the ore can be produced in a fit condition for the tube mill feed."

The Denny brothers, have for years, been advocating the substitution of other machines for stamps. There are still many stamps in use and they have their champions. The tendency in Ontario is to substitute ball mills for stamps, and in most of the recently installed gold milling plants there are no stamps. There is a probability that the stamp will long be used for certain ores, though experience with Porcupine gold ores will probably convince operators that ball mills are more suitable for Northern Ontario gold ores.

MARITIME OIL SHALES.

Exploitation and development in the Canadian Maritime provinces, says the monthly review published by the Department of Colonization and Development of the C. P. R. goes oftimes unheralded by any great amount of publicity, but because the people of that area have their own modest ideas of unostentatious progression it is erroneous to conclude that little is being done. Steps which have recently been taken to develop the oil shales of two of the provinces have considerable significance for the industrial future of the Canadian Maritimes.

New Brunswick has long been known to geologists, engineers, and interested capitalists as possessing extensive bituminous or oil shales, which exist in the counties of Westmorland and Albert, near Moncton. Though no real attempt has been made to make use of them commercially, it has long been known from experimentation that they possess a richer value in oil and by-products than the famous Scottish shales which have been operated very profitably for years. The quantity of the rich shale is practically unlimited and has been estimated by several mining engineers at as much as 270,000,000 tons.

In Pictou county, Nova Scotia, there is an area of about ten square miles estimated to contain 500,000,000 tons of oil shales which will yield a minimum of thirty gallons of oil to the ton, of which fifty per cent is available for motor fuel, the remainder making fuel oil, lubricating oils and greases.

A real system of exploitation and utilization of the New Brunswick field is being undertaken by the Imperial Government through the Anglo-Persian Oil Company, in which it owns a controlling interest. This organization has entered on operations in an aggressive manner, making a practical test of the shales, their campaign being an elaborate one designed to cover several years. Upwards of $6,000,000 has been allocated by the company for the purpose of New Brunswick development.

At the outset progress is being made in a slow and sure manner. A retorting plant has been erected at Baltimore which has a daily capacity of eight tons. The material as taken from the surface workings is crushed to egg size and great satisfaction has been expressed with the results to date, the average yield being 32.7 Imperial gallons of crude oil per ton of shale. Some idea of the extent of the projected operations of the company and the volume of the shale deposits may be gathered from a statement that later the erection of a 5,000 ton plant is projected which at the average yield noted above should produce about 60,000,000 gallons per annum from the deposits. An authority declares that there is enough shales in the series to supply five plants of 1,500 ton capacity each for fifty years.

During the present year experiments have been carried on with the Nova Scotia shale deposits in Pennsylvania. The shale was shipped in carload lots and

worked under the supervision of the owner of the properties and heads of the Dominion Government Fuel Testing division and Mines Branch. The type of retort used had a capacity of from fifty to one hundred tons per day and can be brought up to three hundred or more tons per day for single retorts. With access to the Atlantic and Gulf of St. Lawrence direct from the works, transportation for oil extract and by-products is ideal.

The Anglo-Persian Oil Company has declared its intention in the building of plants, erection of machinery, etc., to utilize as far as possible the products of the Maritime provinces. The development in Nova Scotia must also have a local benefit industrially. This taken with allied activities and the export of products should make the entry of these companies in the field a reason for yet greater faith in the future of the Canadian Maritimes.

HOLLINGER EXPLORING SHININGTREE PROPERTY.

The Toronto Star publishes the following from Sudbury under date 26th Oct.:

Hollinger interests have invaded the Shining Tree area for the second time. The announcement that they taken an option this week on 13 claims in the area has caused a sensation in local mining circles. Two diamond drills are being taken in, and material for the establishment of a camp is already on order. The optioned claims are situated in the townships of Fawcett and Asquith. An amount well over six figures is said to be involved in the deal, which was concluded in a Sudbury legal office yesterday, and the options are reported to be for six months.

Prospectors, although surprised by the news, have not been flurried. It is only a matter of two or three years until Shining Tree develops into a camp of importance, they claim, the trouble so far being that it has been held too cheaply by capital, considering the showings made.

The properties referred to are the Burke-Landagne-Cochrane-Bulloch claims. Mr. P. E. Hopkins, of the Ontario Bureau of Mines, mentions these in his Shining-Tree report. He says: "Messrs. Burke, Landagne, Coehrane and Bulloch have staked a group of claims on the west shore of Granite lake, Fawcett township. On one of these claims a large quartz deposit can be seen running north and south under the water near the mouth of Papoose creek. A portion of the vein was picked up by trenching in a swamp four chains to the south of the showing at the water's edge. A 20-ft. shaft was sunk on the creek bank, from which point a cross-cut was driven towards the creek for a distance of 78 feet. Mr. Burke stated that the cross-cut passed through 14 feet of quartz and schist which yielded considerable gold on assay. The dump shows much mineralized schist and quartz, a rough sample from wich yielded $2.00 in gold per ton. Owing to the low land it is difficult to prospect the surface. The vein occurs in a fracture which cross-cuts the altered pillow lava and rusty carbonate schist at about right angles. Hence it is in many ways similar to the Ribble vein which outcrops about two and one-half miles to the north. The vein occurs in a fracture parallel to the Ribble vein, or it may possibly be a continuation of the Ribble, although the writer did not learn of any discovery in the intervening area."

The Ribble vein is the deposit which has been developed at the Wasapika property. The Burke is on the line of strike; but owing to low-ground separating the properties, the relation between the deposits cannot be definitely determined yet. Mr. Hopkins reported that the vein could be traced for one mile and that it is probably much longer.

MINING TAXATION IN BRITISH COLUMBIA.

This Subject Will Be Discussed During Present Session Of The Legislature.

Mine operators of British Columbia are making strong representations to the Government in regard to what are termed the present excessive taxation levies. A delegation of representative Coast mining men waited upon the Provincial Executive recently in this connection, and there is to be another discussion of the matter at an early date between the Government and those identified with mining in the interior of the Province.

One of the chief concessions sought is that a greater allowance be made for depreciation of property when the annual assessments are prepared. Mr. Valentine Quinn, of the Granby Consolidated Mining & Smelting Company, voices the views of mining men when he says: "There is no reason why the same procedure with regard to other tax reductions cannot be ruled with regard to development, depreciation and depletion in the mining industry. If we are going to be taxed it is better to tax us on our real income. If the assessment is made up on the true income of any Company there is no objection. What we do object to is the withholding of our right of appeal if our determination does not agree with that of the Finance Minister. We feel that we have a right of appeal and should be able to establish our protest in the Court if necessary."

Honourable John Hart, Minister of Finance said that he had no objection to appeals being made. This intimation was received with marked appreciation.

Dealing with the matter of taxation, W. R. Esling, Member for Rossland in the Provincial Legislature, maintains that the municipality of Rossland should be given the monies it would receive were it permitted to tax the lands and improvements of mining companies. These Companies pay a 2% tax to the Province on ore mines, and are exempted from municipal levy. He said that the producing mines had yielded in the past few years in excess of $18,000,000.00 and had paid into the Provincial Treasury $700,00.00. In return for the loss Rossland sustained the Provincial Government handed back in special grants $140,000 or much less than could have been collected by the city from the lands and improvements of the mines.

There is no doubt that more will be heard of this question of the taxation of mines during the present session of the Provincial Legislature. The problem of taxation in all its phases is to be before the Legislators, it being the intention of the Government to take some action towards relieving the financial embarrassment of the municipalities by granting them a greater share of the sources of provincial revenue. As to mining, the Government is being assailed on the one hand by the mine operators who are endeavouring, quite naturally, to obtain improved reductions and on the other by the municipalities who are insisting that their coffers shall be more adequately filled by the diversion of pro

vincial funds. The situation is one not easily solved to the satisfaction of all parties, but there is no doubt that the Government is seized with the need of encouraging the mining industry and it is equally certain that the representations of those identified with it will have every consideration.

SOME DRILLING TROUBLES, THEIR CAUSE AND REMEDY.

Prepared for Canadian Mining Journal By F. A. McLEAN, C. I. M. & M.

A frequent source of drilling troubles is stuck steel, and a common cause of this is improper alignment of the drill steel with the hole. When this occurs, the drill steel will bear on at least two points in the drill hole, thereby having a tendency to bend and cause a severe grinding action on the reaming surfaces of the bit which increases with the divergence from true alignment. (See Fig. 1.)

This causes difficult rotation or, in some cases, stops rotation altogther, and is generally due to ignorance or carelessness on the part of the drill runner. The steel should be brought nearly into line to have it enter the hole. An experienced drill-runner can line up the drill laterally "by sight". He does this after entering the steel and cranking it nearly to the cutting face, then tightens his "tee bolt nut". He then opens the throttle a little and lets the drill find its own vertical line; helping it meanwhile, by raising up on the crank end and finally tightening the clamp bold nut. When holes are very much out of line it is often best to abandon them entirely and start new ones.

Proper Type of Bit.

The choice of the proper type of bit is an important consideration in securing the best results from rock drills as a whole, for no matter how efficient the compressing plant, the mining methods and drilling machines, or how careful the operator, if the bit is dull or of incorrect shape, the rock is not cut, expensive energy is wasted, and money and time are lost.

In the design of a good bit, the cutting and staying qualities should be considered as well as the ease and rapidity with which it can be made in the blacksmith shop. The most important of these, of course, is the rapid cutting quality because the object in view is to cut the maximum rock in the minimum time. The importance of the staying quality is determined by the labor of sharpening and the cost of transportation and handling.

Allowable loss of gauge is an important factor, for the greater the loss the larger must be the diameter of the starting steel to insure a certain diameter of hole at a fixed depth. This means a loss of power, so this point should not be lost sight of in determining the bit to be used. Operators who believe the gauge should be retained irrespective of the amount of power used, run the edges of the wings of the bit back about one inch in a line parallel to the axis, making the bit a reaming tool.

If this is done, as soon as the cutting edges wear a little the shoulders begin to bind and stick against the sides of the hole and it must be reamed out to a size which will allow the bit to move forward. When such bits are removed from the holes they will show greater wear on the edges of the wings than on the cutting edges.

As the bits are about as hard one-half inch back of the cutting edge as they are on the face of the latter, it seems only reasonable to suppose that there has been as much work done in wearing the wings as in wearing an equal amount at the cutting edge. Therefore, if the reaming edges show more wear than the cutting edges, it is evident that they have done at least as much work as the latter and as much, if not more power has been expended in reaming the hole than in cutting it.

Furthermore, the Rock Drill being designed to cut rock by means of a blow, as soon as a bit starts reaming the side of the hole it is retarding the cutting action of the drill and putting severe strain on the rotating mechanism. It is thus apparent that because of the rapid loss of power and the wear and tear on the drill, little of the efficiency of the bit should be sacrificed to the reaming qualities.

Essentials of a Drill.

Experience has shown that to be successful under average conditions, a drill should embody the following essentials:

(1) It must take full advantage of the chipping and fracturing of the rock. In a bore hole there is a certain depth to which rock will fracture when struck by a sharp tool. If the tool is driven deeper than this it does not fracture the rock, but crushes it. If the cutting edge of the bit is blunt it does not get full advantage of the fracture and a considerable portion of the force of the blow will be expended in crushing or pulverising.

(2) The wings of the bit should be as thin as is consistent with its standup quality to allow for the ejection of the cuttings. If the wings are left heavy there is little space for the escape of cuttings and consequently they are held in front of the bit and continually churned and ground. Under these conditions the bit does not reach solid and the blow loses a large proportion of its cutting power before it reaches the rock.

(3) The bit should be perfectly free in the hole at all times and on account of the tendency of the rock to fracture—the drill hole will be a trifle larger than the cutting edge. If the bit is so designed that the cutting edge has the same diameter as the distance across the diametrically opposite corners and will remain so until dull, it will always be free in the hole.

(4) The bit must allow equal wear on all corners. If the bit is not symmetrical, viz.: if the ends of all cutting edges are not the same distance from the center of the bit—the longest end will cut a groove on the side of the bore hole and a rifled hole will result. Furthermore, the wear is unequal and the extra strains set up in the steel often cause breakage. The rotation of the drill is also impeded and the parts of the machine subjected to excessive wear.

(5) The bit must be dressed in a manner consistent with the treatment of good steel. It must not be overheated or worked while too hot. Light, rapid blows should be used in forging and the proper temper determined by experiment and rigidly adhered to. The bit should be allowed to cool thoroughly after forging and should then be re-heated for tempering. **It should never be sharpened and tempered on the same heat.**

Bits Should Fracture the Rock.

An angle of about 90° for the cutting edge is generally accepted as the correct angle. If the angle is greater the bit has a tendency to crush rather than fracture the rock, and as a rule cuts slowly. An angle less than 90° gives a bit which will cut as fast but is one which is likely to break off and wear rapidly. There is also a tendency for it to enter the rock—especially soft rock—past the point of fracture and expend energy in crushing or wedging out the rock.

The thickness of the wings should range from ¾ in. on a lage steel to ⅜ in. or even less on a stoper and hammer drill bit. The wing must not be so thin that it breaks off but, the less stock the better the clearance for the cuttings.

The 14′ and 5′ Double-Taper Bit.

The bit that has been found most successful for rapid cutting, long-wearing gauge, and ease of making and re-sharpening, is the 14′ and 5′ double-taper cross or four point bit as made in machine sharpeners of the Leyner type (Fig. 2). This bit has a guiding surface of the same diameter as the cutting edge that backs up the latter with a good stock of metal, increasing the life of the gauge. This guiding surface prevents the steel from running off into the seams or fissures and results in faster drilling and less hardship on the operator.

From the foregoing, the necessity for having correct drill bits is obvious. In the hand-sharpening—and even with some power sharpeners—it is common to find one of the ends of the cutting edges protruding 1/32 to 1/16 in. beyond the others. In sharpeners of the Leyner type this difficulty has been effectively overcome by entirely enclosing the bit under a heavy pressure while it is being forged. When this is done, there can be no question as to the corners falling within a circle whose center is the axis of the steel.

Manufacturers of steel drill sharpeners are continually making machines more nearly fool-proof. One of the latest improvements for assuring better bits, is the use of double-bored gaging blocks with an adjustable latch guide (See Fig. 3). The wide range of these blocks permits the operator to gage accurately an entire normal run of steel on the one set of blocks, and these adjustments for the various gages require only the pressure of a finger on the adjustable latch guide.

Various Causes of Trouble.

An interesting but rather rare cause of drilling trouble, is the feeding of too much or too little water through the hollow drill steel. When too little water is fed, a mud collar often forms behind the drill steel which makes it difficult to extract the latter. When drilling into rock-bearing metallic ore and too much water is fed, a mineral separation sometimes takes place. The gangue is sludged off and the drill hammers away on the metallic residue and finally becomes stuck. Sometimes dry drills are run in abrasive ground which soon heats up the steel and burns the temper out of the bit. The remedy for this condition is obviously the use of a water feed or a wet drill.

At times, the shank portion of hexagon steel becomes so badly worn that it either damages the piston or anvil block or permits the steel to slip in the rotative sleeve, or again, the lug on round steel may wear or break off with similar results. When this happens, the drill steel is hammered into the ground without rotating and soon gets stuck. The only preventative measure, is to keep the shanks in proper condition (See Fig. 4). Similar troubles result from the use of worn or broken drill parts, such as pawls, chuck bushings, pawl springs and rifle bars. The only sure remedy is to replace the worn or broken parts.

The rotation of some drills may be too weak for the conditions under which the drill is used, but this trouble is exceptional, as rock drill manufacturers have strengthened the rotative power of their drills up to the practical limit. Quite frequently, though, trouble is attributed to weak rotation when that is far from being the true cause.

Unequal cutting may easily take place when drilling into a seam or in fitchery ground, and this throws the steel out of line and sticks it. Drilling into brecciated ground sometimes causes pebbles or small bits of rock to fall behind the bit, and these wedge against the steel and the drill hole stopping rotation. In some limestones and other calcareous formations the water mixing with the cuttings will form a mud collar back of the bit.

In all of these instances, it becomes a question of loosening and removing the stuck steel. The one universally popular method of performing this operation, that is, "hitting the steel a few good cracks with a 16 lb. sledge" while sometimes effective—and perhaps conducive to the operator's peace of mind—cannot be condemned too strongly, as usually it results only in bent steel, broken drill parts and an explosive vocabulary (Figs. 5 and 6).

Lubrication and Drills.

The one best motto or axiom when this or other forms of trouble occurs is, "When in trouble lubricate." Then open the throttle and 99 per cent of the time, the steel will back out of the hole without any further trouble. The blow slightly loosens the drill steel and the properly lubricated rotative parts take care of the rest.

Rock drill lubrication is not given sufficient thought, yet it is one of the most important items in drill operation. Representatives of the large oil companies and rock drill manufacturers are carrying on a continual campaign of education along these lines. Their greatest foes are ignorance, thoughtlessness and negligence. However, the increased ease of operation and the greater drilling speed of properly lubricated drills should convert the operator to a proper consideration of this matter, while increased footage and decreased cost for drill repair parts should convince the mine manager.

There are proper and improper lubricants for rock drills, just as there are for any other high-speed machinery. With every drill shipped, manufacturers include an "oil-tag" which designates the best lubricants for that drill. These tags embody information that has meant exhaustive and costly testing on the part of the drill manufacturers. The information is valuable and should be recognized as such. However, in spite of all this, some operators still think that "axle grease is good enough," others think cylinder oil will do, and others don't think about it at all. Sales engineers or service men of either the oil companies or the rock drill manufacturers, are always pleased to consult with mine executives and to give them the benefit of expert knowledge and long and varied experience gathered from all quarters of the globe.

The writer desires to express his thanks to Mr. D. E. Dunn, of New York and the Ingersoll Rand Company, for permission to use the drawings and some of the information contained in this article.

ASBESTOS IN QUEBEC.

A brief statement by Dr. Robert Harvie on asbestos deposits in Ranges 1 and 2, Weir township Bonaventure country, Quebec, appears in the summary report of the Geological Survey, Ottawa, for 1920, Part D. The asbestos occurs sparingly in serpentine which forms two or three narrow belts having a maximum thickness of less than 300 feet. The fibre observed was very short, the proportion of fibre is extremely small, and the means of access to the deposit is poor. Dr. Harvie, therefore, concludes that the occurrence has at present no commercial possibilities.

STORAGE OF COAL.

That there are unsolvable technical difficulties in the way of the plan recently suggested by President Harding to the American Mining Congress whereby the production of coal might be made more uniform, and conditions of unemployment ameliorated and seasonal periods of depression largely obviated in the mining industry by the provision of storage reservoirs in which coal could be stored in quantity by large consumers and producers, is declared by Dr. H. Foster Bain, Director of the U.S. Bureau of Mines. Careful analysis may show an extremely slight loss in the heating value of most bituminous coal after storage for a considerable period, says Dr. Bain. This loss, however, is very much smaller than is commonly supposed by the public, and in burning the coal little or no difference can be distinguished. Certain coals have an extra market value when carefuly sized; handling these coals in and out of storage causes some breakage and may lower slightly the market value of particular coals, but this loss in value relates largely to the availability of the coal for certain classes of equipment and for certain uses, rather than to its actual heating value.

Spontaneous combustion in coal, the most troublesome factor in handling large storage piles, can be prevented, if proper methods of storage and supervision are adopted.

"The adoption of a general policy which would provide reservoirs of bituminous coal to be drawn upon in times of great demand or of low production is entirely a commercial question," continues Dr. Bain. "If the producer, or the dealer, or the large consumer, could produce or buy coal in the spring or summer for a price low enough to justify the cost of putting coal in storage and its rehandling, minus a fair insurance rate that he would be guaranteed a continuous supply in time of need, storage would become common."

"This lower seasonal price of coal could be brought about by concessions on the part of the miner, the mine operator, and the railroads. For the sake of obtaining more regular employment, the miner might accept a lower wage or rate in certain seasons of the year, although this is doubtful; but the mine operator might accept less profit during the same periods in order to keep up his production. Steady and regular mine operation at capacity production always means lower production costs, as compared with intermittent operation and lessened production. Overhead expenses—taxes, interest, management, together with the expense of keeping the mine in proper working condition—all go on, whether production is light, heavy, or has entirely stopped. The railroads could assist by accepting a lower freight rate on coal moved in the spring and summer.

"The small individual consumer, especially in the cities, often has inadequate storage space. Storage at the mine may allow a steady working-day in time of stortage of cars but will not ensure steady seasonal operation. Again, large scale storage at the mines does not do away with the difficulty of transportation often experienced to the points of consumption. Moreover, a great many mines are in a hilly or mountainous country, where but little, if any, space is available for large storage capacities. The proper place, therefore, for storage on a large scale is at or near points of consumption.

"This latter kind of storage involves the use of a large plot of ground, as coal stored 10 feet high allows slightly less than 10,000 tons storage per acre. The purchase and installation of mechanical coal handling devices and systems would also be necessary.

"When, at such a projected storage plant or yard, coal can be purchased at a delivered price sufficiently low to secure a fair return on the investment, after adding the operating costs of storage and rehandling, then coal storage yards will become established near all of the points of heavy consumption and the present seasonal variations will be largely avoided.

"There are no mysterious or unsolvable technical or mechanical questions that block the way to the adoption of a general policy of storing bituminous coal, in either large or small quantities."

U.S. COAL PRODUCTION.

Apprehension of consumers over the effects of a possible railroad strike was no doubt the chief cause of a sharp increase of coal production in the week ended October 22. The total output of bituminous coal, including lignite and coal coked at the mine, is estimated at 10,993,000 net tons, an increase of 1,302,000 tons in a single week. The rate of production attained under the stimulus of emergency demand was not far below normal for this season of the year. In the corresponding week of 1917, for example, 10,844,000 tons were produced; in 1918 about 11,170,000 tons, and in 1920 over daily loadings increased steadily up to Wednesday, but declined but little thereafter.

Monday, October 17	33,826
Tuesday, October 18	35,556
Wednesday, October 19	35,964
Thursday, October 20	35,459
Friday, October 21	35,496
Saturday, October 22	28,916

A further sharp increase is indicated by telegraphic reports of loadings on Monday and Tuesday of the present week (October 24-29), which were approximately 38,200 and 36,600 cars, respectively. The total for the two days shows an increase of 5,424 care over the corresponding days of the week preceding.

Whether the increased rate of production will be maintained now that the strike has been averted remains to be seen.

TORONTO COAL PRICES.

Toronto, 1st Nov.—It was pointed out last week that, when the railroad situation looked serious in the United States, coal men in Toronto ordered in quite a bit of coal to take care of their customers. Now the strike has been averted and there is a surplusage on hand. The consequence is that the market is quite a bit softer just now. Prices of both lump and slack are from ten to twenty-five cents a ton less than those obtaining a couple of weeks ago. However, the surplusage will probably be absorbed in a couple of weeks, and then prices will stiffen up. Information from reliable sources points to the fact that concerns which have long neglected the advice to get their coal in are likely, before many moons, to wish that they had taken it, and had been more liberal in their orders. For a car shortage is said to be likely to interfere with rapid deliveries of coal. As regard anthracite, today's cold weather has caused quite a lot of citizens to bestir themselves with the object of replenishing their bins.

Northern Ontario Letter

THE SILVER MINES.

The price of silver appears to have become steady at around 70 cents an ounce. But, in spite of this, the mines which have not already been re-opened, will probably remain closed until spring. This is the belief gathered as a result of discussing the situation with certain of the officials of these mines.

Coniagas Treating 600 Tons Daily.

On October 31st, the Coniagas closed another favorable fiscal year. The last half of the year was marked by establishing a high record in point of tonnage, the mill having handled an average of upwards of 600 tons of ore daily during the closing months of the period. The ore yielded an average of less than 10 ounces of silver per ton, in spite of which the year's operations showed a substantial profit. It will be several weeks before the annual statement may be prepared.

Crown Reserve.

The future of the Crown Reserve Mining Company appears to be wrapped up in the Porcupine Crown, which company in turn controls the Northern Mines. The Crown Reserve is also endeavoring to secure and develop new properties the more promising of which is a group of claims in the Larder Lake district. These claims were referred to in last week's Journal, and although they are not yet regarded as a probable source of revenue, yet the mineralization is encouraging.

Mining Corporation Producing about 6,000 oz. Daily.

An average of approximately 300 tons of ore is being handled daily by the Mining Corporation of Canada and the average daily output is understood to be close to 6,000 ounces of silver. This is the highest tonnage record ever established by the corporation, and will result in an aggregate output of around 1,600,000 ounces for the year. But for the curtailment of work for some time during the past winter, while alterations were being made in the mill, the production for the current year would have reached about 2,000,000 ounces.

Nipissing.

The cable which operates the aerial tramway of the Nipissing from the Meyers shaft to the mill broke on Thursday last, and caused a temporary delay in the transportation of ore from the north side of Cobalt Lake. The aggregate monthly output will not be greatly hampered, however, as at the time of writing the cable is being quickly repaired. The company is continuing exploration work on the Rochester property in the Porcupine district.

Hudson Bay Mines.

Milling operations are being continued on the Hudson Bay Mines, but the end of the resources appear to be in sight. Within a few weeks, the broken ore will have passed through the mill, and with no further exploration or development work under way, the mine will likely close down. As regards the reports that the company may become involved in the control of the Cane Silver Mines, nothing has been announced officially, although it has been definitely learned that certain of the officials are already deeply interested.

New Interest in South Lorrain.

By reason of the outstanding success recently met with on the Keeley Silver Mines, the entire South Lorrain district is arousing quite widespread interest. The fact that the Keeley encountered an exceedingly rich ore shoot at depth and along a fractured zone which extends through a considerable area, lends greatly increased merit to a number of neighboring properties. Various property owners are showing renewed enthusiasm, and the coming winter promises to witness the commencement of a substantial amount of exploration work. In the meantime, the Keeley mill is being enlarged so as to handle about 60 tons of mill rock daily, with the intention of keeping the plant in operation throughout the winter.

Not a few mining men have come to regard the South Lorrain area as one of the more promising districts in Northern Ontario in which to explore for silver, and the recent success on the Keeley is believed to signalize considerable interest turning from Cobalt in that direction.

Elk Lake and Gowganda.

Reports that the Trethewey Company might instal a small mill this winter on its Gowganda property is one of the leading topics of discussion in this district. It is believed that the operation of this property on a profitable basis would provide incentive for other property owners to renew their efforts. In the meantime, however, the Gowganada field is comparatively quiet.

In the Elk Lake district itself, interest in silver mining is at quite a low ebb, and attention is turned more to the Fort Matachewan district where it is believed that some definite move will be made during the coming winter to get operations under way on the leading property, the Matachewan Gold Mines.

THE GOLD MINES.

Dome.

A feature in connection with gold mining in the Porcupine district is that mill heads at the Dome Mines recently approached a point close to the Hollinger. It has been learned by the Journal that the ore going through the Dome mill has recently resulted in an income of over $7 per ton, and that for the month of September, the income was not far under one quarter of a million dollars. The mill treated a total of upwards of 31,000 tons during the month. The mill has a capacity of 45,000 tons monthly when treating low grade ore, but, on the higher grade now being handled, is able to treat a maximum of 1,100 tons daily.

Thompson-Krist.

At the annual meeting of the Thompson Krist, the old board of directors was re-elected. The threatened action of the Porcupine Crown to foreclose a mortgage on the Northcrown Mines, which is the operating company for the merged properties of the Thompson-Krist and Porcupine Crown, was considered, and it was decided to carry on further negotiations with the Porcupine Crown with a view toward determining what kind of a settlement may be arranged. It will be recalled that in the consolidation of the Thompson-Krist with the Porcupine Crown, a new company known as the Northcrown Mines was formed as the operating company, while two-thirds of the stock in the Northcrown was allotted to the Porcupine Crown and one-third to the Thompson-Krist. The Northcrown subsequently found its treasury depleted, thus necessitating the holding companies to advance funds. The Porcupine Crown advanced money, but the Thompson Krist appears to have been unable to do its share. Accordingly, the Porcupine Crown took a mortgage on the Northcrown, and is now threatening to foreclose.

Porcupine V. N. T.

It is reported at Porcupine that the new central shaft which the Hollinger may ultimately drive to a depth of 4,000 feet will likely be near the north side of the property and comparatively close to the bound

ary of the Porcupine V. N. T. It is also learned that the greenstone schist in which the greatest of the orebodies on the Hollinger occur is dipping sharply to the south under the overlying basalt toward the Porcupine V. N. T., and this appears to hold out exceedingly favorable prospects for the latter property. It is a matter of record, that the orebody which placed the Porcupine Crown on a dividend-paying basis, dips onto the Porcupine V. N. T. at a depth of between 1,100 and 1,200 from the west, all of which is considered to be important for the Porcupine V. N. T. which holds 120 acres, made up of a block of ground half a mile in length immediately adjacent to the Hollinger on the south.

Will Drill Beaumont Property.

A diamond drilling outfit has been purchased by the Beaumont Company, owners of the former North Davidson property. This equipment, which will be used to explore the property to a depth of about 500 feet, is already in course of transportation to the Beaumont.

March Gold Co.

A force of about 16 men is engaged on the March Gold, a property situated in the township of Deloro, in the neighborhood of the Ankerite property. The erection of camps is about completed, and the company is said to have about $20,000 in the treasury with which to carry on further exploration work.

Kirkland Lake District.

Last week's reports mentioned in the Journal, in which it was stated that the question of consolidating the Teck-Hughes Mining Company with the Orr Gold Mines, are understood to be premature. The Journal has learned on good authority that the prospects of the merger are very remote.

Another deal is pending on the Hunter-Kirkland. Negotiations have reached an interesting stage and, if successful, will assure the aggressive operation of this promising property. The Hunton takes on added merit owing to the success being met with on the adjoining Ontario-Kirkland, where a new mill is being completed and with prospects of turning out gold bars before the end of the current year.

Lake Shore.

On November 10th, the Lake Shore will disburse a dividend of 2 p. c., amounting to $40,000. This will make a total of 6 p. c., amounting to $120,000 paid so far this year. Since commencing milling operations on March 8th, 1918, the Lake Shore has produced approximately $1,500,000 and has paid a total of $400,000 in dividends. In addition to this, the mine has been extensively developed underground, and has a large tonnage of high grade ore blocked out. In fact, in one stope alone there is upwards of $500,000 in "broken" ore made up of ore containing $28.57 per ton. Officials of the Lake Shore declare they are unable as yet to tell the size of the mine as they are still "toddling along in their infancy." Close observers who have witnessed achievements to date, as summarized above, are speculating upon the future when "full maturity is reached."

Granby Kirkland.

Good results are reported on the Granby Kirkland property. The surface of the property has been extensively prospected and a total of 14 veins have been opened up. One of these has a width of approximately six feet and contains encouraging gold values. It is planned to sink a shaft on this vein.

Larder Lake.

The Coniagas Mines of Cobalt has secured a property in the Larder Lake district, in close proximity to that being explored and developed by the Crown Reserve. It is still too soon to estimate whether this new interest in the Larder Lake district will result in success, but is generally agreed that the present outlook is better for that field than ever before since gold was first discovered there a decade and a half ago.

Bousquest Gold Mines

Work has been suspended for the time being on the Bousquest Gold Mines in the Sudbury district. It is understood an arrangement may be made under which the company will resume operations at a fairly early date on a newly acquired property. The original effort is stated to have been disappointing, while the outlook on the newly acquired property is more promising.

White Rock.

Among the new mining concerns which appear to be making sound and substantial progress in Northern Ontario is that company known as the White Rock, which is being promoted by business men of Sudbury.

The company has an authorized capitalization of 1,000,000 shares of the par value of $1 each, there being 450,000 shares in the treasury. The Sudbury interest raised $40,000, with which an exceptionally favorable showing has been made on the property. This includes a shaft to the depth of 65 feet and 175 feet of drifting, in addition to a large amount of surface exploration. The vein has been traced for approximately 2,600 feet, with 600 feet having been stripped. It is stated that whereas the vein has a width of about two feet at surface, it has widened out to about six feet in the underground workings and with high gold values in evidence.

The White Rock is equipped with a small mining plant as well as a 2-stamp mill and a saw-mill.

British Columbia Letter

Stewart, B.C.: The sudden flooding of the Salmon River, as well as of other rivers and creeks in the Portland Canal District, has done much damage to roads and trails serving mining properties. Repairs will be necessary in a number of sections to permit ready access to some of the well-known mines and prospects of the country.—There are 22 men employed on the Silverado Group, some being engaged on a tram road and the others in development work.

Alice Arm, B.C. The David Copperfield Group, which joins the Dolly Varden on the south, has been bonded for the sum of $75,000, payments running over four years. Work this winter will consist of the driving of a tunnel and the development next summer will be carried out on a considerable scale.—The Waverley Group of three claims has been bonded by A. McGuire for $30,000. It is situated on the northeast fork of the Kitsault river. Some rich ore has been uncovered on the Moose Group, Kitsault Valley.—In driving a crosscut at a distance of 140 feet from the portal and at a depth of approximately 140 feet the vein is some 18 feet in width. The last five feet of this cut is in ore said to average 34.2 oz. silver per ton while samples have given 240 oz. silver to the ton. Good indications also have been encountered in the upper tunnel, where a fifty foot vein is reported to average 21 oz. of silver to the ton.

Hazelton, B.C.: It is reported from Terrace, B. C. that a Ross Mill has been installed on a free milling gold property situated on Maroon Mountain, east of Kitsumkalum Lake. High returns have been secured and J. M. Hoar, the manager, anticipates success. The site is at an elevation of 5,000 feet and about five miles from the lake. Operations can only be carried on until snow interferes so that the winter, for the most part, will be spent in further developing the property. The Mill consists of a crusher which breaks the rock to quarter inch in which shape it enters the mill. Revolving balls pulverize this material. Water carries off the gangue. It is claims for the Mill, which has a capacity of between 15 and 20 tons of ore per 24 hours, that it will make a recovery of between 80 to 90 per cent. The Kitselas Copper Co. Ltd. still is busy on a 400 foot cross-cut tunnel designed to obtain drainage and stoping levels.

Merritt, B.C.: The Calcium Carbonate Co. has resumed operations. Its equipment includes an automatic pulveriser driven by a small motor. One ton of finished material can be turned out per hour and sample shipments are being prepared for immediate delivery. There is said to be a good market for the product both in east and western Canada and the Company expects soon to be able to operate steadily. There is sufficient material in the deposit to supply all needs.

Trail, B.C.: Ore receipts in gross tons at the smelter of the Consolidated Mining & Smelting Co. for the week ending October 14th totalled 3,185. Of this 3018 tons came from the Company Mines, 98 tons from the Josie, Rossland; 36 tons from the Republic, Republic, Wn.; and 33 tons from the White Water, Retallack.

Quesnel, B.C.: Recent reports of a placer gold strike on the south side of Cedar Creek, about four miles from Quesnel Lake, are said to be substantially correct. The find was made in July by old prospectors, A. E. Platt and J. Lyons, who kept it quiet until three or four weeks ago. The ground now is staked for seven miles each way from the first location. Platt maintains that he will have no difficulty in taking out $100 a day and says that, if it were not for the timber, he would be able to make it $500. There is said to be plenty of water for the rocker.

Britannia Beach: Two men are entombed in the mine of the Britannia Mining & Smelting Co. at the time of writing (October 26th) and every effort is being made towards their rescue by their fellow miners. The Chief Inspector of Mines and one of his staff are on the ground. The men are L. C. Craig and Francis Patenaude. They are believed to have water within reach and a supply of food. It is possible, therefore, that they will be found alive although it is some days since the accident occurred.

Vancouver, B.C.: Glenville A. Collins, Engineers Ltd., of Vancouver, have taken a lease and bond on the Sally Mine, owned by the Wallace Mountain Mines, Ltd. The property has produced more than $100,000 in ore values. The new holders propose extensive development, the drinking of a 1,000 foot tunnel being planned.

Victoria, B.C.: Recent gold discoveries on Iron Creek, Taseko Lake District, have been attracting attention. Much of the ground open has been staked and something of a rush to the district is looked for in the Spring. Holders of claims are agitating for a road. They assert that the section can be reached without crossing either Warner or Taylor Passes, the route suggested being by way of Williams Lake on the Pacific Great Eastern Ry. and Hansville. By adopting this means of ingress they say that only some ten or twelve miles of construction through open country will be necessary. The matter is being investigated.

Valentine Quinn, of the Granby Consolidated Mining & Smelting Co., is quoted as saying that there now are some 890 men on the payrolls of the Hidden Creek Mine and the Anyox Smelter. The plant now is shipping as much blister copper as at any time in its history. Two steamer loads a month are coming south en route to eastern refineries. Technical improvements in smelting have reduced the demands on the coke plant. Formerly the whole battery of thirty coke ovens was insufficient to supply all the coke needs. Now sixteen ovens supply all the coke that the smelter needs for night and day work at full capacity. The per man unit of production for Granby is said now to be greater than that of any other smelter on the continent. Since the destruction of the great German chemical works all of the ammonium sulphate from the coke plant has found a ready market. Seventeen thousand gallons of benzol produced each month is shipped to Vancouver. The remaining 7,000 gallons is used at Anyox.

JAMES W. DAVIS JOINS ENGINEERING EQUIPMENT CO., LTD.

James W. Davis, for the last seven years District Sales Manager for Canadian Ingersoll-Rand Company, Limited, with headquarters in Montreal, has severed his connection with that Company, after twenty years of service, and has become associated with Engineering Equipment Company Limited, New Birks Building, Montreal, in the capacity of General Sales Manager. Mr. Davis has, for many years, been a familiar figure about the Mining Camps of Central and Eastern Canada, having been stationed in Cobalt and Porcupine for some time, before being moved to Montreal.

Engineering Equipment Company, Limited, has just completed arrangements with Stimpson Equipment Company, Salt Lake City, for the exclusive manufacture and sale of Mitchell Electric Vibrating Screens in Canada and Newfoundland, and Mr. Davis will devote a large part of his time to the promotion end of the Company's business. The Mitchell Gyro-Ballistic Crusher will also be introduced into Canada by the same Company and will no doubt create a great deal of interest in the engineering profession.

Mr. Davis is probably best known in the Thetford Mining District, having been among first to recognize the importance of the Asbestos industry and it is safe to assume that he will in future be closely associated with the progress of mining and milling in that field. Mr. Davis is a member of the Engineer's Club, Montreal; St. George's Club, Sherbrooke; Thetford Golf Club, Montreal; Temple Club, Three Rivers, Fish & Game Club, Canadian Railway Club, and an associate member of the Canadian Mining Institute.

METAL QUOTATIONS.

Following are the fair average price for ingot metals (in less than car-loads):

Toronto.	Cents per lb. 1st Nov. (Unchanged since last week).
Copper, Electric	17
Copper, Casting	16¾
Tin	35
Lead	6¾
Zinc	7½
Aluminum	27
Antimony	9

That the average prices for ingot metals has been unchanged for some time is due to the fact that the market is just holding its own and has been in that condition for several weeks now.

TORONTO MINING QUOTATIONS.

Quotations on Active Stocks on Standard Stock Exchange on 29th October, 1921.

Silver.	High	Low.	Last.
Adanac Silver Mines, Ltd	1	¾	1
Beaver Consolidated	24	20	22
Crown Reserve	12½	12	12
Gifford	½	⅜	½
Great Northern	1½	1½	1½
Hargraves	⅝	⅝	⅝
La Rose	35	32	32
McKin.-Dar.-Savage	20½	18½	19
Mining Corp. of Can.	1.15	1.05	1.05
Nipissing	5.85	5.60	5.60
Ophir	1¾	1	1
Peterson Lake	6	6	6
Silver Leaf	1	1	1
Temiskaming	22	22	22
Trethewey	11¼	11	11¼
Gold.			
Atlas	15½	14	15½
Dome Lake	7½	6	6
Dome Mines	20.15	19.40	19.65
Gold Reef	2	1½	1½
Hollinger Cons.	7.50	7.41	7.45
Hunton Kirkl'd G.M.	9½	8	9½
Keora	13	9	10½
Kirkland Lake	34	30	30
Lake Shore M. Ltd.	1.26	1.22	1.24
McIntyre	1.91	1.86	1.87
Newray Mines, Ltd.	5	5	5
Porcupine Crown	12½	11½	12½
Porcupine V.N.T.	16	15½	15½
Preston East Dome	2½	2½	2½
Schumacher	23½	22	23
Teck-Hughes	17	15½	15½
Thompson Krist	2½	1½	2
West Dome	6⅞	6½	6½
West Tree Mines Ltd.	3¾	3½	3¾
Wasapika Gold M. Ltd.	3⅞	3½	3⅞
Miscellaneous.			
Vacuum G.	3¼	3	3

OIL POSSIBILITIES OF LOWER ALBANY BASIN.

In his report to the Geological Survey on investigations along the Lower Albany River, Mr. M. Y. Williams says:

In reporting upon the oil possibilities of virgin territory such as the James Bay basin, three main points must be considered. These are, indications of oil such as seepages or springs; the presence of sedimentary formations similar in character and age to those which bear oil elsewhere and the presence of impervious cover and rock structure favourable for oil accumulation.

In the region traversed, no oil seepages have been reported. However, as the outcrops are mostly in the river beds at or below water level, the seepages may easily have been overlooked or they may be obscured by gravel and sand. Of the formations observed, the lower Salina and upper Niagara or Guelph, and the Onondaga limestone contain oil elsewhere. The Onondaga limestone is, however, unpromising on the Albany, since it is everywhere exposed and eroded, the shale which elsewhere retains accumulations of oil in rock of this age having been long since removed. The Trenton limestone—oil-bearing in Ohio and elsewhere—underlies the younger rocks to the northwest, but its presence in the Albany region, though probable, is not certain.

Thus the dolomites of Guelph and Salina age are the most likely containers of petroleum pools. A sufficient cover is probably present to retain oil from the upper outcrops of red Salina shale on Kenogami, Albany, and the tributary rivers down to the bay, but conditions would appear more favourable both for cover and thickness of formations from the Forks down. It is probable also that the Trenton limestone underlies this region.

The general structure observed is too flat to favour the accumulations of large oil fields. There are, however, indications of fairly marked structure along Albany river, between Snake and Flat islands, where a syncline, with sides dipping at from 3 to 4 degrees, is followed by the river. Accompanying anticlines may be looked for to the north and south. Outcrops are so scattered that it is not possible to draw definite conclusions as to structures, but where the shale beds are well exposed, little indication of other than slight undulations is present.

Drilling machinery and supplies may be taken down river from the Canadian National railway at the crossing of the Pagwachuan near Pagwa station, by means of scows, provided that advantage be taken of high water in the spring. Should locations be made below the Forks, the scows could be used during the summer, except in very low water, for transporting the outfit to successively lower points as wells were completed. Arrangements could probably be made with Revillon Freres for bringing out machinery and other equipment the following spring, provided work were abandoned.

The first wells should be drilled to the Precambrian crystalline rocks, and samples of cuttings should be kept every 5 feet, and sent to the Geological Survey for examination. It is not probable that the total thickness of the sedimentary formations is more than 600 or 700 feet.

ASBESTOS SITUATION IMPROVED.

The situation at the Mines in the asbestos district, according to reports received therefrom has bettered itself. During the month of August the schedule was four days a week; during September this schedule was increased to six days a week. During the height of the demand the Mines were running night and day whereas the six day time is only a six hour day. Increased operations at the Mines would not have been put into effect had the demand not returned. The demand will eventually reflect upon prices.

EDITORIAL

MINING AND THE TARIFF.

In the present election campaign, the question of the tariff far out-distances all other competitors as a fertile subject of prolific discussion, both from the public platform and in the public press. A good many wise things are, doubtless, being said and written about it — and certainly a good many things that are *otherwise*. Neither those who uphold, nor those who denounce, Protection have been very notably successful, in their advocacy of their respective views, in avoiding "the falsehood of extremes." Protection, as we have known it hitherto, and know it today, in Canada is neither so black as it is painted in some quarters, nor so spotlessly white as it is represented as being, in others.

The tariff question is, in the very nature of things, a question with which all those interested in whatsoever capacity, in the mining industry, have an intimate concernment. Whatever the party complexion of the Government returned to power, as a result of the present appeal to the people, may be, it must be animated by a resolute determination to increase production. To that end, the development of our natural resources is essential. Of such natural resources, our mineral resources form a unit of great and increasing importance, by reason not only of the position to which they have already attained as contributing, by their development and yield, to the aggregate wealth of the country, to the building of communities and to the employment of labor, but also (and in still greater degree) of their vast future potentialities in the same beneficent directions.

In their efforts to develop the mineral resources of Canada, great risks are inseparable from the part that the producers are called upon to play. For, in the case of every mining venture, the uncertainty attaching to the development stages, is an invariable and a formidable factor to which regard must be had. Hence, it is necessary that no unnecessary impediments should obstruct the path of those who are blazing the trail of an industry that is calculated to enure so greatly to the benefit of the country at large.

Such a consideration brings us naturally to the question of the tariff in its relation to the mining industry. Producers feel — and rightly feel — that, in the framing of a tariff, regard should be had to their interests. At the same time, we believe we are correctly interpreting their viewpoint in saying that they recognize that "there are others" — that they do not want to "hog it all" (to use a colloquialism). They recognize that the manufacturer also has interests — and legitimate interests — which it would be unjust to menace and unwise to jeopardize.

Now, it is a matter of common knowledge that a good many lines of gold mining machinery and machine parts have to be imported from the United States because they are not manufactured in this country. Where that is the case, it seems to us to be essential, in the interests of the mining industry of Canada, that such machinery and machine parts should be imported free of duty. For it is obvious that such duty-free importation would tend to increase mineral production — an end as to the desirability of attaining which there can be no dispute.

Some provision, it is true, already obtains, under the existing tariff, in connection with the metallurgy of gold ores, for the free importation of certain of such machinery and machine parts. But, when producers have attempted to avail themselves of this provision, unexpected difficulties, arising from either the regulations or their interpretation, have frequently been encountered. In other words, while the tariff has acknowledged the principle that production should be encouraged, by the admission of such machinery and machine parts duty-free, its application has, in practice, been seriously impeded.

It is only right to acknowledge that satisfactory and substantial progress is being made with the manufacture of mining machinery in Canada. Indeed, the progressive spirit evinced by many Canadian concerns, turning

out products of this kind, has been very notable, especially of late. And we are persuaded that producers, as a body, desire nothing less than to interfere with the legitimate protection such as renders their enterprise remunerative and their industry possible.

As things look to us, in this connection, what is required by those who are called on to frame a tariff is an intelligent understanding, and an adequate appreciation, of the situation. Advice should be sought from, and consultation should be had with, both the mining operators, on the one hand, and the manufacturers of mining machinery in Canada on the other. This would result in an intelligent understanding, and a sane application, of the principle that the mining operating industry should be encouraged, but not at the expense of manufacturing industries already established and endeavoring, often under substantial handicaps, to serve the country well.

THE GEOLOGICAL SURVEY.

It is interesting to note that in Great Britain the Geological Survey Board is providing for increased activity. Four field units are being constituted, in addition to the five which have formed the basis of the staff organization since 1900.

In Canada, where there is so much work for the Geological Survey to do, there has not, in recent years, been any great increase in activity. The pioneer work, done by the field parties in all parts of the country, has been of great value. The progress made is, however, limited by the fact that the staff is small and the territory very large. It would seem that the revival of activity of the Geological Survey in Great Britain means that the work has value. If it is of value there, it must surely be of great value here.

THE POWER SITUATION AT PORCUPINE.

There is, as yet, no announced solution of the power situation at Porcupine. The Ontario Government has not yet given the Hollinger company the permission necessary to enable it to go ahead and develop power on the Abitibi river. The Northern Canada Power company has not made public its plan for providing power, and is evidently waiting for information as to what the mining companies and the Government intend doing.

The best news in this connection is that the fall rains have so improved the situation that the power company is satisfied that the present supply can be maintained during the winter.

CARBONIZATION OF PEAT.

The Fuel Research Board has issued a report on investigations into utilization of machine-won peat. Air-dried peat was subjected to a series of experiments on the carbonization of peat in vertical gas retorts with steaming. Further experiments are necessary, but the Board considers that the results already obtained are encouraging. In view of the attempts made to use Ontario peat, the results of these investigations of the Fuel Research Board will be interesting here.

THE BRITANNIA DISASTER.

We have, as yet, only meagre accounts of the damage wrought by flood at Britannia Beach. It would appear, however, that the early accounts were not much exaggerated, and that nearly forty lives were lost when the waters of the big reservoir were let loose. The Britannia company has had more than its share of trouble, having, in recent years, suffered from rockslide, fire and flood.

EDITORIAL NOTES.

The United States Bureau of Mines recognizes the good work done on Miners' Field Day. Commenting on the Butte contests the Bureau says: "The Bureau representatives feel that the Butte annual miners' field day is an unqualified success, not only as regards the forwarding of first aid and mine rescue work and of general mine safety and accident prevention, but also as to the opportunity it presents for the dissemination of information on efficient modern mining practices and the growth of general good feeling. The Butte mining companies are to be congratulated for their progressiveness in establishing such an excellent institution, and it is to be hoped that there will be no interruption in the holding of the field day annually for a number of years to come."

According to reports from Dawson, a steamer and six barges are wintering at West Dawson shipyards to be in readiness for shipments of ore from the Mayo mine early in the spring. This far north producer of silver ore is evidently making good headway with development.

It is reported that an Ontario mining company will explore under option a gold property at Elbow Lake, Manitoba.

Visitors to the Kirkland Lake district who have been said to represent Mr. Thomas Lawson of Boston are not pleased with the notoriety. We are not surprised.

ELECTROTHERMIC SMELTING OF ZINC.

An investigation of the electrothermic smelting of zinc and the condensation of zinc vapor is being undertaken at the Mississippi Valley Experiment Station of the Bureau of Mines at Rolla, Mo., in cooperation with the Missouri School of Mines and Metallurgy. A critical study of the physics and chemistry of the condensation of zinc vapor will be made for the purpose of obtaining sufficient data to design a condenser for an electric furnace which will result in the elimination or diminution of the formation of blue powder.

The Fluorspar Deposits of Madoc District, Northern Ontario

By M. E. WILSON.

The following description of the fluorspar deposits of Madoc district, Ontario, is based on examinations of these deposits made by the writer during the summer of 1920 while engaged in the geological investigation of the Madoc and Marmora map-areas.

That fluorspar-bearing veins were present in Madoc district was known to some of the local inhabitants more than thirty years ago, but these were not then regarded as commercially important. The first attempt to mine the mineral was made by the late Stephen Wellington who in 1905 put down a prospect pit 14 feet deep on the Bailey property. During the years following this operation a small amount of prospect work on the fluorspar deposits of the district was performed, but little interest was taken in the mineral until the year 1916 when owing to the world war the price paid for fluorspar rose to as much as $30 per ton. As a consequence of this increased demand the production of fluorspar from the Madoc district rose from no production in 1915 to 7,286 tons valued at $153,190 in 1918. Since 1918 the production has gradually declined. When the writer examined the fluorspar properties in 1920 there were six deposits on which mining operations were being performed, but the greater part of the production of the mineral was being derived from the two principal mines of the district, the Noyes and the Perry. Now, however, both of these properties are idle and active mining of fluorspar in the Madoc district has ceased.

The production of fluorspar from Madoc district since the year 1905 has been as follows:

Year	Tons	Value
1905	30	$ 150
1907	15	75
1910	2	15
1916	1,283	10,146
1917	4,327	66,474
1918	7,286	153,190
1919	3,425	60,389
1920	3,704	67,381

The village of Madoc, near which the deposits occur, is situated in the central part of Southeastern Ontario about 25 miles north of the north shore of lake Ontario, and at the northen end of the Belleville-Madoc branch of the Grand Trunk railway. It lies 7 miles north of Ivanhoe station on the main line of the Canadian Pacific railway between Toronto and Montreal via Peterborough.

The deposits outcrop mainly in two localities: (1) the northern part of Huntingdon township; and (2) the southern part of concession I, Madoc township. Since nearly all the deposits in the first locality occur either in the vicinity of Moira lake or along the continuation of the Noyes-Perry fault which crosses Moira lake, they will be referred to collectively as the Moira Lake group. The deposits occurring in the southern part of concession I, Madoc township, on the other hand, will be designated the Lee-Miller group.

*Extracts from Summary report published by Geological Survey, Ottawa.

General Character of Deposits.

The fluorspar deposits of the Madoc district are all veins occupying fault fissures of post-Ordovician age. They consist chiefly of fluorspar and barite, or fluorspar, barite, and calcite intermingled in varying proportions. The less common minerals present are celestite, quartz, pyrite, marcasite, chalcopyrite, tetrahedrite, malachite, and elaterite, but all of these with the exception of the celestite are quantitatively unimportant.

The most characteristic features exhibited by these veins are the presence of two ore-zones separated by a zone of fractured or brecciated wall-rock and of lenticular masses of ore usually situated where two such parallel ore zones unite. Where two ore zones are present, one is generally wide and the other relatively narrow. The width of the zone of fractured country rock intervening between the ore zones ranges from a few inches to 10 feet or more in proportion to the average width of the main vein. The lenses of ore that occur on the veins range from a few feet to 200 feet in length and from 2 feet to 17 feet in maximum width. The longer direction of the principal lenses that have so far been opened up on the Noyes-Perry vein all appear to extend diagonally down the vein towards the southeast. The structural explanation of this feature was not determined by the writer.

The material composing the fluorspar deposits occurs chiefly in two ways: (1) as alternating bands; or (2) as an irregular network forming the partitions between caverns. In vein material of the first variety cavities are relatively uncommon, whereas in vein material of the second class cavities form a large part of the total volume. On this account the two varieties of the ore may be appropriately designated for the purpose of description the "banded" and "cavernous" types respectively.

It has been previously noted that the mineral composing the fluorspar-bearing veins consists chiefly of varying proportions of fluorspar, barite, and calcite. Furthermore, the relative abundance of these minerals varies so greatly, even in adjacent parts of the same vein, that the grade of fluorspar produced from different properties or from the same property at different times varies considerably.

The colour of the Madoc fluorspar is most commonly white, grey, or green, but honey-yellow, blue, purple, rose, and red varieties are also common. Some of the large, brilliant, clear crystals embedded in celestite in the Kane vein and the transparent, pale green crystals obtained from the deposit on the Perry property are exceptionally beautiful.

Structural Features.

That the fissures occupied by the fluorspar-bearing veins are related to faulting is indicated (1) by the abundance of fractured and brecciated wall-rock associated with the fissures, (2) by the slickensided and strated character of the wall-rock on either side of the vein, and (3) by the displacement of contacts observed in underground workings. The first and second of these features can be observed almost anywhere in

the workings along the veins, but the third feature was seen only in the underground workings on the Noyes and Perry properties.

The displacement that has occurred along the Noyes-Perry vein is shown at the extreme southeast end of the underground workings on the Noyes property by the manner in which the contact between the Precambrian granite and the overlying Palaeozoic limestone has been dislocated. Here the contact was encountered on the southwest side of the vein at a point approximately 40 feet lower than on the northeast side indicating apparently that the southwest side had been downthrown 40 feet with respect to the northeast side. The striae on the walls of the vein, however, are not vertical but nearly horizontal and indicate, therefore, that the faulting in reality was in a horizontal direction and consisted either of a movement of the rock on the southwest side of the vein towards the northwest or of the rock on the northeast side towards the southeast. Since neither the slope of the Palaeozoic-Precambrian contact at the point of dislocation nor the direction of movement along the fault place is definitely known, the exact amount of displacement resulting from the fault movement cannot be determined, but it probably was not less than 100 feet and may have been considerably greater than this amount.

The evidence of displacement on the Perry property is the dislocation of the contact of the grey banded Precambrian limestone and an intruded mass of granite. The contact of this granite mass, which outcrops south of the vein and forms the wall-rock in the workings adjacent to No. 3 shaft should under normal conditions cross the vein in a north-south direction so that in drifting along the vein to the southeast the limestone would be met first on the northwest side of the vein. In reality, however, the relationships were reversed at the end of the drift driven to the southeast from No. 3 shaft at the 140-foot level, for the wall-rock on the southwest was limestone, and on the northeast granite. Furthermore, since the striae on the walls of the vein in this locality also are approximately horizontal it is evident that at this point, as on the Noyes property, either the rock on the southwest side of the vein has moved towards the northwest or that on the northeast side of vein has moved towards the southeast. When the writer last visited the Perry property in September, 1920, the limestone-granite contact was situated about 20 feet from the end of the drift on the southwest wall of vein, but had not yet been intersected on the northeast wall so that the amount of displacement along the vein was not determined, but it was at least greater than 20 feet.

The fluorspar veins almost without exception trend in a northwesterly direction. The veins belonging to the Moira Lake group likewise are distributed in a northwesterly trending zone; the veins belonging to the Lee-Miller group, on the other hand, although individually trending in a northwesterly direction, lie in a zone trending only 15 degrees west of north.

The most striking structural feature exhibited by the fluorspar veins is the presence of horizontal or nearly horizontal striae on the wall-rock of the veins belonging to the Moira Lake group. The well-developed character of these striae, their presence on the wall-rock of every vein belonging to the group, and the absence of striae in any other direction seem to indicate that all the displacement along these fissures was in a horizontal direction.

Palmateer.

The fluorspar deposits situated farthest to the south in the district are those outcropping at the north end of lot 18, concession VIII, Huntingdon township, the property of Mr. George Palmateer. In this locality the Palaeozoic limestone, which underlies nearly the whole of the southern part of Madoc district, is cut by several small fluorspar-bearing veins.

The material composing these veins consists mainly of fluorspar, barite, and calcite. The fluorspar is chiefly a colourless, massive, white or green variety, but on the ore pile near the No. 2 pit some crystallized red-looking fluorspar was observed which consists of colourless fluorspar in which red particles (probably hematite) were distributed in zones parallel to the crystal faces.

Although these veins are relatively small their presence on this property is important because they all trend in a northwesterly direction and lie directly on the continuation of the Noyes-Perry vein, thus indicating that the Moira Lake fracture system continues as far south at least as this locality.

Wright.

Wellington and Munro of Madoc have excavated a series of ten prospect pits in the gravel which overlies the Palaeozoic bedrock on this property which adjoins this lot on the west. In one of these pits situated near the middle of the series—an excavation about 50 feet long, from 20 to 55 feet wide, and 10 feet deep—a vein of fluorspar was discovered. When the writer examined the pit the walls had caved-in and the only evidence of the presence of fluorspar that could be observed was the fragments of vein material that had been piled nearby.

Howard.

Several carloads of fluorspar have been shipped from a deposit situated near the north end of lot 14, concession XI, Huntingdon township. The discovery of fluorspar in this locality was made by Stephen Wellington who, with Mr. Munro, worked the deposit during January and February 1918, and then sold the property along with the Noyes mine, which adjoins the Howard on the northwest, to Canadian Industrial Minerals, Limited. The operations commenced by Wellington and Munro were not continued by the new owners, however, and the property lay idle until August, 1920, when Wellington and Munro obtained an option on the lot from Canadian Industrial Minerals, Limited, and resumed operations.

A number of scattered prospect pits have been excavated on this property, but the only openings in which a vein has been found are two northwesterly-trending pits situated about 300 feet east of the Howard farmhouse. The northern of these pits is about 70 feet long, 10 to 15 feet wide, and 2 to 15 feet deep. The other pit which is situated about 50 feet to the south is about 60 feet long, 10 to 20 feet wide, and 10 feet deep. A shaft now filled with water but said to be 25 feet deep has been sunk from the bottom of the north pit close to its southeast end. In September, 1920, a new shaft was being sunk from the bottom of the south pit near its northwest end, and at that time was 25 feet deep. The walls of the pits consist of grey, flat-bedded Palaeozoic limestone overlain by gravel and boulder clay. The latter material has slumped down from the pit faces covering the bottoms of the pits so that the vein was not seen by the writer except in the southeast face of the north pit and in

the faces of the new shaft. At the first of these points the vein was 2 feet wide, but was said to be 5 feet wide in the old shaft only a few feet away. In a new shaft it was from 5 to 7 feet wide but included a considerable proportion of limestone fragments in places. The vein material is mainly white to grey, massive fluorspar, but includes some barite and calcite.

A diamond-drill hole was put down on this property at an angle of 61 degrees towards the northeast from a point about 60 feet to the south of the old shaft.

A mass of red granite penetrated at a vertical depth of 131.2 feet was presumably a boulder and indicates that the drilling was discontinued close to the Precambrian-Palaeozoic contact. The Palaeozoic in this locality, is, therefore, about 150 feet thick. The vein of fluorspar was cut in the drill hole about 10 feet to the southwest of the outcrop of the vein at the surface and has, therefore, an average dip of 80 degrees.

The Noyes Mine.

The Noyes mine, the property of Canadian Industrial Minerals, Limited, is situated on the top of the high area of granite that outcrops to the south of the eastern and lower part of Moira lake. It lies about one-half mile east of Moira Lake station on the Madoc branch of the Grand Trunk railway, where a siding has been constructed by the company.

The discovery of fluorspar on this property was made by Donald Henderson of Madoc in 1916. In that year Henderson, in company with Chesley Pitt, purchased an option on the mining rights of 20 acres in the southeast corner of lot 13, concession XII, Huntingdon township, and after sinking prospect pits along the outcrop of the vein they sold their option in the early part of 1917 to Wellington and Munro who had previously acquired an option on the remainder of the property. Wellington and Munro then commenced mining operations and continued to work the property until March, 1918, when they sold their options on lot 13 with the mining rights to some adjacents lots, to Canadian Industrial Minerals, Limited. This company continued mining operations until the autumn of 1920 when the mine was closed down. Over 15,000 tons of fluorspar was produced from the mine during the period of its operation.

The belt of Palaeozoic limestone that underlies the southern part of central Ontario is delimited on the north in places by steep northward-facing escarpments that rise abruptly to a height of 150 feet above the Precambrian complex exposed at their bases. An escarpment of this type lying along the south shore of Moira lake is interrupted directly east of the narrows where the Grand Trunk railway crosses the lake by an embayment three-quarters of a mile in width, on either side of which the escarpment turns southward and gradually disappears on the slope of a knob of Precambrian granite. The principal workings on the Noyes property are situated close to the eastern edge of this granite mass, but the vein from which the ore has been mined has been traced almost continuously in a northwesterly direction to the shore of Moira lake and in a southeasterly direction into the Palaeozoic limestone.

The fluorspar produced from the Noyes mine has been obtained chiefly from lenticular enlargements on a vertical or nearly vertical vein which extends in a northwesterly direction diagonally across the property. These lenses range from a few feet to over 200 feet in length and from a few inches to 17 feet in width. They consist mainly of fluorspar and barite in varying proportions, fluorspar being predominant in some lenses and barite in others. In practice only that part of the vein in which fluorspar predominates is taken as ore.

Blakeley.

The Blakeley property is situated west of the Madoc-Belleville road where it ascends the Palaeozoic escarpment that adjoins the south shore of Moira lake. The discovery of the fluorspar on this lot was made by James O'Reilly in 1916, but most of the development work was performed by the late Stephen Wellington and his associates. Several carloads of fluorspar were shipped from pit No. 1 and shaft No. 1 by Wellington during the summer of 1920.

There are at least three fluorspar deposits present in this lot which for the purpose of description may be referred to as the north vein, the south vein, and vein in pit No. 1.

The north vein trends approximately north 40 degrees west (magnetic) and has been traced at intervals for over 500 feet.

The south vein on the Blakeley property trends north 4 degrees west (magnetic). It can be observed in pit No. 4, in shaft No. 2, and in a trench situated about 80 feet north of pit No. 4. Pit No. 3 is an excavation 40 feet long, 10 feet wide, and 6 feet deep, from the bottom of which, at a point about 10 feet from its south end, shaft No. 2 has been sunk to a depth of 25 feet. The vein material exposed in these openings consists mainly of alternating bands or zones of white barite and colourless to honey-yellow fluorspar. The proportion of barite and fluorspar varies greatly from point to point, but on the whole the barite predominates. The width of vein material exposed in shaft No. 2 ranges from 2 to 6 feet. The vein material observed in the trench that has been excavated along the outcrop of the vein further to the north ranges from 6 inches to 1 foot in width and is similar in character to that seen in pit No. 4.

Pit No. 1 is an excavation 50 feet long, 6 feet wide, and 30 feet deep that was opened up by Stephen Wellington during the summer of 1920. The vein material exposed in the pit consists mainly of fluorspar and occurs in two zones separated by a much fractured mass of the limestone wall-rock. The total width of the vein material ranges from 1 to 3 feet. Since this vein trends north 35 degrees west (magnetic) and is situated 30 feet to the southwest of the continuation of the north vein, it might be assumed that it is a separate parallel vein having no connexion with the north vein, but the results from diamond-drill hole No. 1 have shown that the north vein dips to the southwest, so that at depth it lies almost directly on the continuation of the vein in pit No. 1. It is possible, therefore, that this vein is a branch from the north vein. The walls of the pit are polished and striated, indicating that the fracture in which the vein occurs is also the locus of a fault. Since the striae trend almost horizontally the direction of movement along the fault was presumably nearly horizontal.

Two diamond-drill holes were put down on the Blakeley property in 1918 by Canadian Industrial Minerals, Limited. In hole No. 2 no fluorspar was found, but in hole No. 1, 7 feet of vein material was cut at a depth of 142 feet. From these data it can be calculated that the vein was crossed by the diamond drill at a vertical depth of 111 feet and at a point situated about 25 feet to the southwest of shaft No. 1.

The Perry Mine.

The Perry mine is situated about 2 miles south of the village of Madoc and close to the north shore of the narrows that divides Moira lake into upper and lower divisions. The principal workings on the property lie only a few hundred feet to the west of the Belleville-Madoc branch of the Grand Trunk railway with which the mine is connected by a siding.

The outcrop of the vein on the Perry property is said to have been laid bare at the time the Belleville-Madoc branch of the Grand Trunk railway was being built, but no attention was paid to the discovery until the year 1912, when Messrs. Cross and Wellington purchased an option to prospect the property. Actual mining operations were first undertaken in the autumn of 1915 and except for an interval of about 11 months between December 1, 1917, and November 1, 1918, were carried on continuously from that time to the autumn of 1920.

The rocks occurring adjacent to the Perry mine, so far as observed, are all of Precambrian age and fall into two principal groups: (1) a number of sedimentary types belonging to the Grenville series; and (2) masses of quartz syenite and granite similar in character to the Moira granite that outcrops in extensive areas south and east of Moira lake.

The fluorspar found on the Perry property occurs in a northwesterly-trending vein that outcrops in two rock-areas that protrude through the swamp adjoining the north shore of Moira lake. Since this vein trends in the same direction as, and lies directly on the continuation of, the vein on the Noyes property to the south of Moira lake, it is evident that the veins on the two properties belong to the same fracture system and are probably parts of the same vein. One of the two rock areas in which the vein is exposed adjoins the north shore of Moira lake, whereas the other area is situated across the swamp about 700 feet to the northwest.

With the exception of a small stope said to be 20 feet long to the southeast of shaft No. 1, all the underground mining on the Perry property has been carried on from No. 3 shaft. This shaft, which is 140 feet deep, has been sunk close to the west end of a lenticular mass of granite 50 feet long and 10 feet wide that lies between northeast and southeast branches of the vein. Between the surface and the 90-foot level, to the southeast of the shaft the northeast branch of the vein is only a few inches wide, where as the south branch widens at a depth of 50 feet to a lens having a maximum width of 4 feet; to the northwest of the shaft both branches of the vein unite forming a single lens 100 feet long and 6 feet wide. Between the 90-foot and the 140-foot levels, to the southeast of the shaft the southwest branch is only a few inches wide, whereas the north branch widens into a lens 80 feet long and 5 feet wide at its maximum point; to the northwest the lens terminates at about 50 feet from the shaft. In reality, therefore, most of the fluorspar found in the vicinity of No. 3 shaft occurs in a lens having a horizontal length of 100 to 130 feet and extending diagonally down the vein to the southeast at an angle of about 65 degrees. From this lens a branch lens extends southeast for about 50 feet at the 50-foot level. Since the main lens has a width of 5 feet at the 140-foot level and no vein material has been removed below that depth the total length of this lens is not known, but its length from its northwest termination down to the 140-foot level is 150 feet. The height of the lens measured parallel to the shaft is about 200 feet, but measured at right angles to its longer direction only 100 feet. Its maximum width is 6 feet. All the ore present in this lens has been removed down to the 140-foot level. During the latter part of the summer of 1920 a drift was driven along the continuation of the vein for 75 feet from the southeast end of the 140-foot level, that is, to a point 160 feet from shaft No. 3 and hence almost directly beneath shaft No. 1. In this distance the vein had an average width of 2 feet.

The vein material on the Perry property is mainly the banded type and consists chiefly of fluorspar, barite, and calcite. The fluorspar greatly predominates, however, and practically all the vein material is sufficiently high grade to be mined. The fluorspar is a honey-yellow, colourless to pale green variety and for the most part occurs in well developed crystals. The less common constituents are fibrous celestite and pyrite.

Coe.

Two parallel northwesterly-trending veins are exposed in some shallow pits that have been excavated close to the north shore of Moira lake on lot 10 XIII, Huntingdon township, the property of Mrs. Arthur Coe, of Madoc.

South Reynolds.

A fluorspar-bearing vein trending north 45 degrees west (magnetic) occurs on the South Reynolds property, lot 7, concession XIII, Huntingdon township, directly north of the outlet of Moira river into Moira lake. The vein can be seen at present along the bottom and faces of an open-cut, 200 feet long, 2 to 6 feet wide, and 20 feet deep, that has been excavated at right angles to the slope of the ledge of Palaeozoic limestone that parallels the west shore of Moira lake in this locality. Throughout a considerable part of the length of the open-cut the deposit consists of two parallel veins ranging from a few inches to 18 inches in width and separated by lenses of limestone up to a foot or more in width. In places along the northeast face of the pit subsidiary veins branch from the main vein, and fade out towards the north, a feature that was also observed along the north side of the Noyes-Perry vein on the Noyes property. The material composing the vein on the South Reynolds property, as in the case of most other deposits, consists chiefly of fluorspar with barite and calcite as less abundant constituents. The walls of the open-cut are slickensided and striated in places and as in the case of the other deposits of the Moira Lake group, the striae are almost horizontal. Two carloads of fluorspar were shipped from this property in 1917.

Rogers.

The occurrence of a northwesterly-trending fluorspar-bearing vein at the south end of lot 10, concession XIV, Huntingdon township, is of considerable interest because the vein at this point lies directly on the continuation of the Noyes-Perry vein and hence affords evidence of the continuity of the Noyes-Perry vein from the Perry mine on the east across the Roger's property to the Kane mine on the west. The discovery of the vein at this point was made by Donald Henderson and Chesley Pitt of Madoc about the year 1909, but actual mining was first undertaken by Messrs. Gillespie, Cross, and Wellington, in 1910. In the following year Gillespie, Cross, and Wellington sold the property to Mr. L. L. Battle from whom it was afterwards purchased by the present owner, Mr. C. M Bowman. Mining opera-

tions have been attempted on the Rogers property at frequent intervals during the twelve years that have elapsed since the vein was discovered, but the greater part of the work on the deposit was performed during 1910, 1911, and 1914.

The principal excavation on the property, an open-cut about 100 feet long and from 5 to 10 feet wide, was partly filled with water at the time the writer examined the property in the summer of 1920, so that neither the depth of the pit nor the character or extent of the vein present in the bottom of the pit could be determined. The form of the opening indicated, however, that the vein material originally present occurred as a lens about 80 feet long and 8 feet wide at its middle. The only vein material seen on the property was a mass that stood above the surface of the water at the northwest end of the pit. This had a width of about 5 feet, and consisted mainly of green to honey-yellow fluorspar. The striae on the walls of the pit are almost horizontal. At a point about 40 feet northwest of the pit a vertical shaft said to be 65 feet deep has been sunk, from the bottom of which a cross-cut has been driven to intersect the vein. It was reported to the writer, however, that no fluorspar was mined by way of this cross-cut. The country rock exposed near the vein and the rock composing the dump from the shaft are mainly the buff-coloured Precambrian dolomite that outcrops extensively elsewhere in the vicinity of the north shore of Moira lake.

Kane.

The fluorspar deposits occurring on the Kane property, lot 9, concession XIV, Huntingdon township, are especially interesting because the principal vein contains a considerable proportion of brilliant transparent crystals of fluorspar up to 4 or 5 inches in diameter. The discovery of the main vein on the property was made by Mr. Kane, owner of the lot, in the latter part of the summer of 1917, when deepening the outlet of a spring. In the autumn of 1917 Mr. Rinaldo McConnell purchased a lease of the lot from Kane, and the following spring after sinking a pit 10 feet deep on the vein, sold his lease to a company known as Canadian Fluorite, Limited, that had been organized in Toronto for the purpose of purchasing and developing the property. The new company continued operations until April, 1919, when the mine was closed down, and all equipment with the exception of the shaft house and ore shed was removed.

Two occurrences of fluorspar are known to be present in the territory included in the Kane property: (1) the main vein which is situated near the north end of the lot, and lies directly on the continuation of the Noyes-Perry-Rogers vein; and (2) a group of veinlets exposed in a small prospect pit situated near the southwest corner of the lot.

North Reynolds.

Near the southeast corner of the north half of lot 8, concession XIV, Huntingdon township, and hence almost directly south of the shaft house on the adjacent lot to the east (Kane property) an area of impure, grey, banded Precambian limestone is exposed, in which two small deposits of fluorspar have been found. The larger of the two deposits is exposed in an east-west trending pit 12 feet long, 2 to 6 feet wide, and 2 to 12 feet deep, and is a mass of the cavernous type about 10 feet long and ranging in width from 6 inches at its extremities to 5 feet at its middle.

Bailey.

The discovery of fluorspar on the Bailey property is said to have been made about thirty-five years ago by Nicholas Fleming, owner of the lot, while excavating the cellar for a house, but no attention was paid to the discovery at that time, and it was not until 1905, when Stephen Wellington purchased an option on the property, that mining operations were undertaken. In that year Wellington sunk the shaft to a depth of 14 feet, and took out a carload of fluorspar in the course of this operation, but the following year allowed the option to expire. In 1907 Wellington renewed the option from William Bailey, who meanwhile had purchased the lot from Fleming, but after taking out a half carload of ore again dropped the option. During the years following the operations of Stephen Wellington, numerous options were taken on the property but actual mining was not resumed until late in 1916, when Mr. H. Hungerford took an option on behalf of the Hungerford Syndicate. This syndicate, after taking out one carload of ore during the early part of 1917, in 1918 purchased the mining rights to the lot outright. When the writer examined the property in the summer of 1920 there was a shaft on the deposit 45 feet deep from the bottom of which a drift had been driven 35 feet towards the southwest. A stope had also been excavated for about 20 feet to the northeast of the shaft.

A number of pits and trenches have been excavated along the outcrops of two small veins or vein-zones of fluorspar exposed on the north slope of a ridge of Precambrian limestone situated a few hundred feet south of the Grand Trunk Railway station at Madoc village. The fluorspar occurs in the excavations on the south deposit as a zone of two or more parallel veinlets, which range from ½ inch to 2 inches in width, and lie from 1 to 2 feet apart. The trend of the veinlets is approximately north 35 degrees west (magnetic); the length of the zone exposed is about 75 feet.

The other fluorspar deposit is exposed in a series of openings lying about 75 feet to the northeast of the south group of pits and consists of one principal vein having a maximum width of 2 feet and an average width of approximately 9 inches.

McIlroy.

The McIlroy property comprises part of the west half of lot 2, concession IV, Madoc township. Mining operations were commenced in this locality in 1916 by Mr. C. R. Ross and were continued at intervals during 1917 and the early part of 118 by Mr. Ross as manager for a company known as Mineral Products, Limited, which, in the meantime, had been organized to take over the property. Since 1918 the mine has been idle. Several hundred tons of fluorspar are said to have been shipped from the property during the period of its operation.

Lee Senior.

A number of fluorspar-bearing veins have been discovered on the east half of lot 1, concession I, Madoc township, by Mr. George Lee, sen., to whom the property belongs. The most important of these occurrences is the No. 5 vein that outcrops close to the west boundary of the property and extends diagonally across the half lot line into the territory belonging to the Wallbridge estate. About 800 tons of fluorspar are said to have been mined from this deposit in 1918 by H. L. Osborne who worked the vein under lease during the greater part of that year. The deposit consisted of a lenticular mass of fragmental or "gravel" fluorspar,

90 feet in length and 8 feet wide at its middle. The fluorspar was mined from the lens chiefly by way of a vertical shaft 60 feet deep from the bottom of which drifts were driven along the vein for 30 feet toward the north and 60 feet toward the south. These workings were inaccessible when the writer examined the property in 1920, but the vein is said to have a width of 2 feet in the bottom of the shaft.

Wallbridge.

There are two fluorspar-bearing veins known to be present on the Wallbridge property which for the purpose of description may be designated the north and south veins, respectively. Of these, the south vein is the continuation of the No. 5 vein on Lee property and the north vein the continuation of the vein on the adjacent Herrington) lot to the north. These deposits were discovered by Mr. C. M. Wallbridge during the summers of 1918 and 1919 while prospecting for the continuation of the Lee vein. Three hundred and eighty tons of fluorspar were shipped from the property in 1918.

PORT ARTHUR MINING NOTES.

By J. J. O'CONNOR.

Developments now being carried on in the Schreiber gold area, confirm the general opinion of men informed as to conditions that are being met with, that this field will soon be the scene of aggressive mining activity. Astonishingly good results are being carried on, in three different areas, all within two miles of the village of Schreiber, while the Duck Lake district 14 miles north, are showing up well under recent development.

A peculiar feature of the Duck Lake area, is what are locally known as "Mud Veins." These veins are composed of a fine gossan, and are from eight inches to fifteen feet in width. Samples of this material have been sent to various points in Canada and the United States for assay. Out of 32 samples $1.40 to $180 per ton in gold.

Mr. William Longworth has just completed this season's assessment work on four claims in this area, he is also the owner of eight other claims.

Wm. McKirdy has been sampling his claims in this district recently, and carrying on some quite extensive development. It is reported that he has granted an option to Eastern parties.

The Gold Range Mine, formerly known as the Jackson, have driven a prospecting tunnel into the hill on TB3326, and intersected the vein at 30 feet. At this point the vein is 2 feet wide, heavily mineralized, showing free gold, pyrites, zinc blende and galena, assaying high values. Another prospect tunnel is being driven 200 yards to the westward in order to cut the vein at that point. Camps are being constructed, and active mining operations will be continued aggressively during the coming Winter. Wm. Jackson is in charge of the work.

Channel samples, covering ten veins on this property, taken from the surface gave assays from $20 to $600 per ton in gold. These veins will average from 4 to 18 inches in width. They cut altered pillow lava and syenite porphyry.

A strong sulphide lead 200 feet wide, on TB3412, formerly the old Otisse mine, has been uncovered, but no work done. It has been thoroughly sampled on the surface, and gives an average of $4.90 per ton in gold.

The most extensive and important work being carried on in this field is at the McKellar-Longworth Mine, BJ122. The formation here is syenite porphyry and felsite porphyry, with some ankerite. There are seven known veins on this property. All have been cross trenched at every 300 feet. The tunnel being driven on the main vein is now in 65 feet. At 30 feet in, a cross cut was driven north 59 feet, and south 30 feet, both of which are being continued. Three veins were met in the north cross cut, and two in the south. The main vein shows visible gold, assays running from $8 to $45 per ton. A shaft is being put down on No. 2 vein half a mile west of the tunnel. This vein is 2½ feet wide, and traceable for 250 feet, and shows free gold wherever uncovered. This vein carries high values in tellurides. There is about 8 tons of ore on the dump, all showing visible gold. A set of samples have been taken from the shaft, and forwarded to D. Johns, Haileybury, for assay.

Another shaft is being put down on No. 3 vein, about midway between the tunnel and No. 2. This work is now down 12 ft. There is no visible gold showing, but tellurides are in evidence. This vein shows considerable shearing.

The new discovery made by Mr. Longworth on X776, near Cook Lake is developing satisfactorily. A shaft is being sunk, and a tunnel is being driven into the hillside in order to cut the vein. This vein is heavily mineralized, no assays have been made as yet. Samples have been taken every few feet in the shaft, and in the tunnel, and forwarded to D. Johns, Haileybury.

REPORTED STRIKE IN ELBOW LAKE DISTRICT.

Hosts of old friends in the Porcupine this week says, The Porcupine Advance of the 26th of last month, gave glad welcome here to Mr. Gordon Murray, one of the old-timers of the Porcupine, who has recently been working hard in the Pas district of Manitoba, in company with his brother, Kenneth, at their chosen calling as prospectors and miners. Mr. Murray spent a number of years in Porcupine and did very valuable work here as a prospector and mining man. He was one of the old-timers who in the early days helped to set this Camp on the way to success and progress. Early in the war he enlisted with the Royal Flying Corps and soon graduated as a fearless and efficient air pilot, giving active service in that line that won him special commendation from the Headquarters of the R.A.F. After the war, Gordon and his brother, Kenneth, went out to the Pas district where they have been very busy ever since. In the Elbow Lake district north of the Pas they have made a remarkable strike, one that does not seem to be often equalled even in rich gold areas. Gordon is in the east at present to interest mining men in the claims referred to. It is understood that he has been successful, though he will not talk for publication on this point.

COAL RESOURCES OF THE WORLD.

A complete and authoritative work on the coal resources of the world was published in connection with the meeting of the International Geological Congress held in Canada in 1913. It may be of interest to our readers to know that this three-volume work with accompanying atlas which originally sold for $25.00 can now be had at a cost of $10.00 per set by applying to the King's Printer, Ottawa.

Production of Ontario Gold Mines

J. A. McRAE.

Gold ore is being put through reduction plants at the gold mines of Porcupine and Kirkland Lake at an aggregate rate of approximately 2,066,400 tons every thirty days, according to figures secured as a result of a preliminary enquiry made in October by the representative of the Canadian Mining Journal.

These preliminary figures are supplemented with an estimate of $1,584,000 in gold bullion produced each month, the estimate being based upon achievements during the past two months.

This means that ore is being drawn from the gold mines of this part of Northern Ontario at the rate of approximately 25,996,800 tons annually, and resulting in a production at the rate of about $19,008,000 a year.

Following is the preliminary estimate at the individual mines:—

Name of Company	Monthly Tonnage	Value per Month	Value per Year
Hollinger Consolidated	110,000	$1,000,000	$12,000,000
Dome Mines Company	32,000	240,000	2,880,000
McIntyre-Porcupine	16,500	175 000	2,100,000
Wright-Hargreaves	4,500	60,000	720,000
Lake Shore Mines	1,800	45,000	540,000
Teck-Hughes Gold Mines	3,200	32,000	384,000
Kirkland Lake Company	4,500	32,000	384,000
Totals	172 200	$1,584,000	$19.008,000

In order to produce gold at the above rate, there are approximately 2,600 men employed at the mines of the Porcupine district, while there are approximately 500 men at the mines in the Kirland Lake district, making a total of 3,100.

These figures do not include the properties in the development stage, but merely deal with the seven mines which are at present producing gold. It is conservative to estimate a total of 300 to 400 additional men on the various properties in the development stage.

Further Kirkland Increase.

As regards the future, it is certain that the Ontario-Kirkland, at Kirkland Lake will be among the producers early in the coming year. This property has a 100-ton mill in the final stages of installation. It is probable that the Tough-Oakes at Kirkland Lake will also re-open its 140-ton mill early in the coming summer. These two mines may reasonably add an aggregate of another $1,000,000 a year to the production from the Kirkland Lake field. There are also the added prospects of mill enlargements on the present producers, and with the likelihood of a new mill being installed on the Argonaut Gold, some twelve miles east of the present producing part of the Kirkland Lake district. Also, there are a half dozen other properties in the development stage the Kirkland Lake field which may reasonably be sufficiently developed to commenced mill construction before the end of the coming year.

Probable Porcupine Increase.

In the Porcupine field, the Porcupine V.N.T. Mines has a mill which may treat 100 tons of ore daily, while the Schumacher is equipped to handle over 200 tons per day and with 140 tons daily at the Porcupine Crown, together with a 100-ton mill on the Dome Lake. These plants are at present idle, but the prospects are that practically every one of them may be in operation during the coming year.

In a word, the mill which may join the producers in the coming year, are the following:—

Name of Company	Daily Mill Capacity in Tons
Schumacher	200
Porcupine Crown	140
Porcupine V.N.T.	100
Dome Lake	100
Tough-Oakes	140
Ontario-Kirkland	100
Total	780

Allowing for an income of $10 per ton, and not making allowance for enlargement of plants such as to possibly 150 tons on the Porcupine V. N. T., the daily production of these mines should reach approximately $7,800 or at the rate of $2,847,000 per year. This production, added to the current output, tends to indicate a yield at the rate of $21,855,000 annually.

Additional probabilities are increases of possibly $2,000,000 a year on the Hollinger and $1,000,000 a year on the McIntyre, thereby bringing a total of close to $25,000,000 within the range of possibility within the next year or so.

GRADING COAL IN ALBERTA.

At the Third Annual Western Convention of the Canadian Institute of Mining & Metallurgy held at Edmonton, Alberta, an address was delivered by the new Premier, Mr. Greenfield; his subject was the Research Work of the Government in the matter of the mineral industry. "The Government is endeavouring" he said, "to develop more markets for Alberta coal, but we have met with one difficulty and that is the grading of the coal." He deplored the lack of uniformity in the grading of coal, for that had proved an hindrance in the market of the product. He concluded, "We advertise, make demonstrations and continue the research work, and I should like to suggest cooperation with the Government as well as to advise you that the uniform system of grading coal is a necessity."

WAGES TO VARY WITH COST OF LIVING.

At a mass meeting of the Canadian Collieries (Dunsmuir) Ltd. recently held at Cumberland, the wage agreement which has existed between the miners and the Company for the past two years was renewed for a similar period. There were a few minor changes, for the most part in the men's favour. The scale of wages has been regulated by the cost of living commission which includes a representative of the men, a representative of the Company and the fair wage officer. The commission investigates the cost of living in the district for three months and regulates wages accordingly. This provision applies to the new agreement. There are over one thousand men affected, and the fact that an understanding was reached without any friction is is a striking commentary upon the good relations existing between the management and the men. Recently the Company erected a large hall for the men at a cost of $30,000. They also laid out a new athletic ground which is said to be one of the best in the Province.

Ontario Wind Engine and Pump Co., Ltd.

This Long-Established Concern Manufactures Wind-mills, Pumps, Stable and Mining Equipment and a Large Variety of Similar Lines.

By A. R. R. JONES.

There are few better-known manufacturing concerns in Canada than the Ontario Wind Engine and Pump Company, Ltd. It was originally incorporated forty years ago under the name of the Ontario Pump Company, Ltd. Of the original incorporators, the only survivor today is Mr. James Brandon, who has been vice-president of the Company, and is now in the real estate business in Toronto Street. The concern carried on business in its early days at the corner of Cecil Street and Spadina Avenue, Toronto, when windmills constituted the sole line of manufacture and the employees numbered only some nine or ten. As an instance of the small beginnings from which this large concern has grown, it may be mentioned that the sales in the first year of its existence amounted to $16,000 only. Mr. S. W. Chapman, who died last Thursday, became secretary of the company in the year 1889, and was with it until three years ago, when he resigned as president, having held that office for a number of years.

The Company was incorporated under its present title of the Ontario Wind Engine and Pump Company, Ltd., in 1900. Some two years before that date, it had moved into its present quarters at the corner of Atlantic Avenue and Liberty Street, Toronto, where both its large factory and its head offices are located. This plant is a three-storeyed building for the most part. The floor space of the factory is 195,000 square feet. In addition, the Company has warehouses in Winnipeg, Regina and Calgary—the floor space of the warehouse in Winnipeg is 31,000 square feet—and branch sale of fices at the three places named and also in Montreal. The whole country is the Company's selling territory.

Company's Products and Officers.

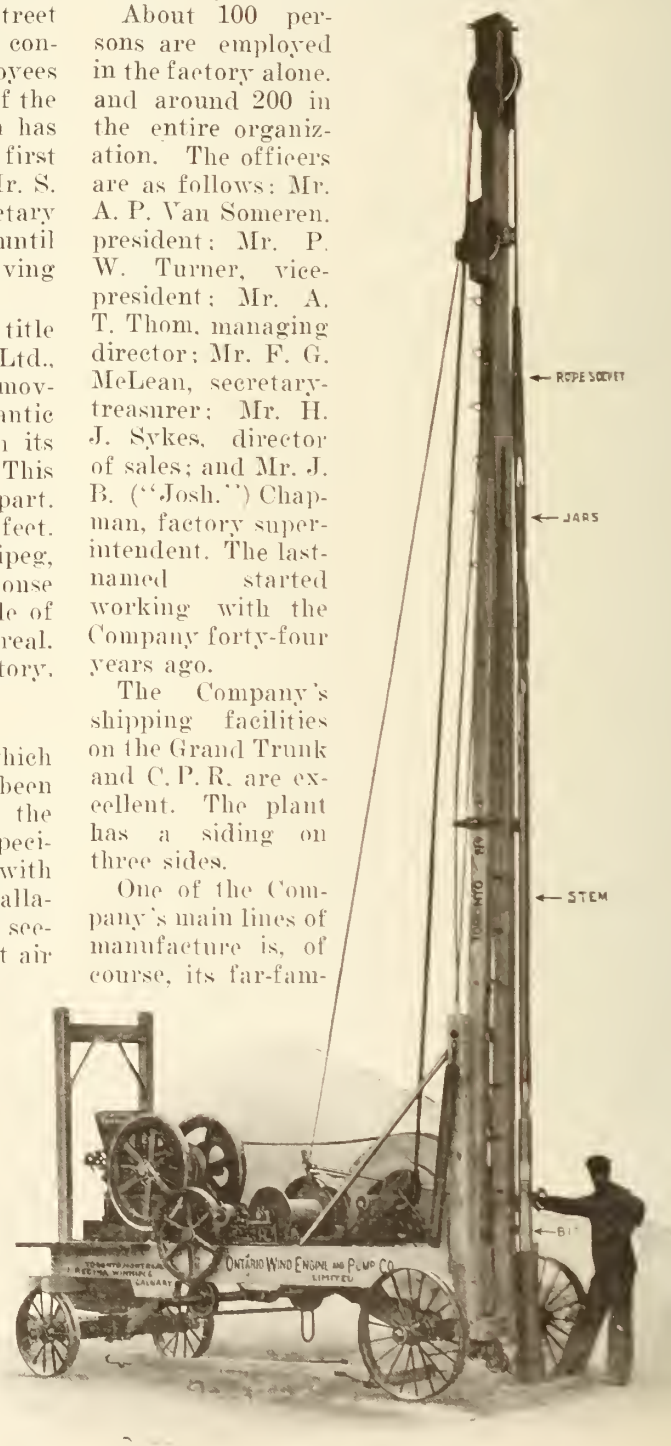
One of the Company's main aims and objects which it has kept before itself consistently, has always been to manufacture machinery which would lighten the burden of the farmer. The first mill in which it specialized was known as the Star mill, a wooden mill with a solid wheel. Then it made a specialty of the Halladay mill, which also was a wooden mill, but with a sectional wheel. It is of interest to note that the first air motor produced by the Company was built in 1894, and shipped to Muskoka where it is still working. By degrees, the Company dropped the manufacture of wooden mills and drifted into other lines.

The Company's products, at the present time, comprise windmills; pumps, iron and wooden; silos, spruce with a double tongue and grooved; ensilage cutters; grinders, galvanized iron tanks; wooden tanks; sprinkler tanks and towers of the trade in which in Toronto the Company does, possibly, some ninety per cent; steel flag-poles; well drills; portable wood saws; scales; stanchions; rams; and watering basins. The Company has its own foundry, and does a jobbing business in gray iron castings. It has galvanized equipment for both hot and electric processes. It undertakes the installation and supply of water systems, for rural, household and municipal requirements; these water systems, when installed are operated by four different methods, namely the windmill, gasoline engine, electric motor and waterfall methods. The company further does a jobbing business in gasoline engines, cream separators and pressure systems. The pressure systems are operated either by hand or by automatic motor.

About 100 persons are employed in the factory alone, and around 200 in the entire organization. The officers are as follows: Mr. A. P. Van Someren, president; Mr. P. W. Turner, vice-president; Mr. A. T. Thom, managing director; Mr. F. G. McLean, secretary-treasurer; Mr. H. J. Sykes, director of sales; and Mr. J. B. ("Josh.") Chapman, factory superintendent. The last-named started working with the Company forty-four years ago.

The Company's shipping facilities on the Grand Trunk and C. P. R. are excellent. The plant has a siding on three sides.

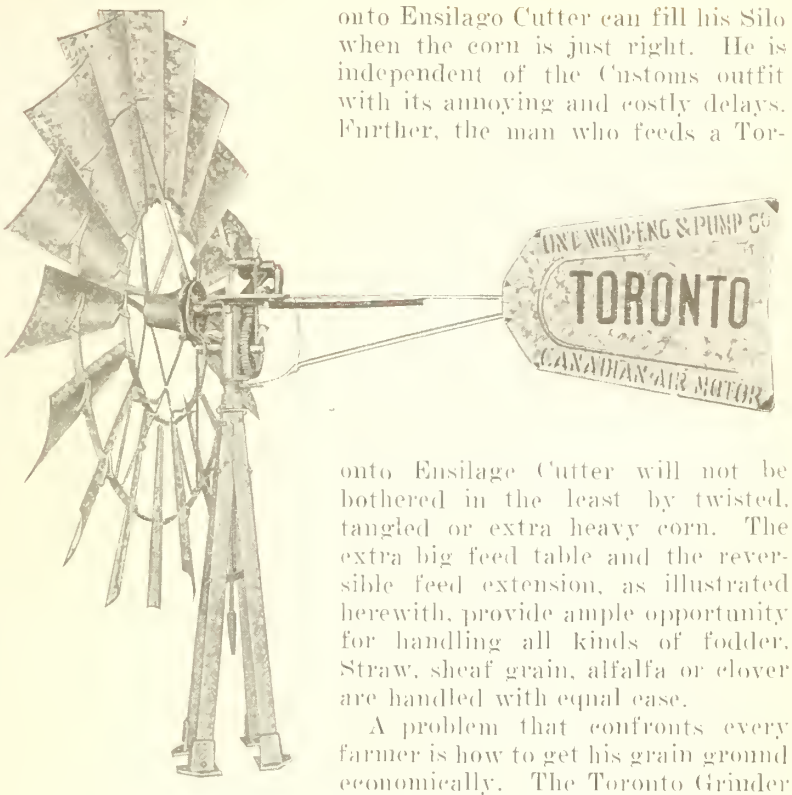
One of the Company's main lines of manufacture is, of course, its far-fam-



A Company Well Drill.

ed Toronto windmills. First, there is its single geared pumping windmills, the bearings of which are constructed of high-grade babbitt fed by large oil cups. It is most important to have smooth surfaces with a minimum of friction, and this method of construction is, by test of time, the best for a windmill. The gears are designed so that three and one-third turns of the wind wheel produce one stroke of the pump. This design enables the mill to work efficiently in a light breeze, and insures against wasting energy in a heavy one. The shafting is made of specially manufactured drawn steel. Its toughness and elasticity are such that it will stand the wear and tear of day and night work during the life of the mill, without replacement. It is absolutely necessary to stop the wheel of a mill when not in use. The brake consists of an expanding cone, which acts by friction on the interior surface of the spider and stops the wheel automatically, when the vane is pulled out of the wind. The Pitman is the rod that converts the rotary motion of the wheel to the reciprocating motion of a pump. It is a piece of malleable iron working on babbitt bearings and supplied with two capacious oil cups.

Then there is the double geared pumping windmill, manufactured for those who desire a heavy duty pumping wind motor. The feature of this is the two distinct sets of gears, pinions and pitmans, which transfer their power to one crosshead to which the pump rod is attached.



A Company Windmill.

Specially Constructed Mining Tanks.

Another special line of manufacture is the Toronto Mining Tanks, which are specially constructed for the Cyaniding process. They have to retain heavy and precious liquids as high as 80 lbs. pressure to the cubic feet. They are made of B. C. Fir, Redwood, Gulf Red Cypress also in White Pine. All Toronto Tank Stocks are air dried. This means perfectly seasoned material. It takes longer than kiln drying but it means longer life and superior material in every way. The White Pine is known as Tank Grade Stock, free from sap, shake, large or unsound knots or other defects. The B. C. Fir is what is known as Superior Clear Tank Grade Stock, free from sap and large pitch pockets and with one clear face. The Gulf Red Cypress and Redwood is Clear Tank Grade Stock, free from sap and other defects. The staves are made of 2 in. or 3 in. stock, surfaced two sides, sawn radially to insure tight joints. Bottoms are also 2 in. or 3 in. stock, surfaced two sides, jointed and dowelled for maximum strength. The hooping is especially strong, of round wrought iron construction up to ⅞ in. size and over that of steel. These are joined by lugs of extra heavy design. Toronto Mining Tanks are in use to-day, giving first-class service to: Dominion Reduction Co., Cobalt, Ont.; Shumacher Mines, South Porcupine, Ont.; McIntyre Mines, Ltd., Porcupine, Ont.; Kerr Lake Mines, Ltd., Cobalt, and many others.

Specialists in Farm Machinery.

As has been noted, the Company specializes in all kinds of Farm Machinery. To mention one important line the Toronto Ensilage Cutter is a thoroughly dependable, efficient machine, which fills a Silo quickly with very little power. The Farmer who owns a Toronto Ensilago Cutter can fill his Silo when the corn is just right. He is independent of the Customs outfit with its annoying and costly delays. Further, the man who feeds a Toronto Ensilage Cutter will not be bothered in the least by twisted, tangled or extra heavy corn. The extra big feed table and the reversible feed extension, as illustrated herewith, provide ample opportunity for handling all kinds of fodder. Straw, sheaf grain, alfalfa or clover are handled with equal ease.

A problem that confronts every farmer is how to get his grain ground economically. The Toronto Grinder here "fills the bill." It can grind anything from ten to forty bushels an hour, right into the feed trim at the cost of a few cents for fuel. As one satisfied purchaser said, the other day: "When I figure the amount of time and money spent yearly on chop done at the mill, and the wear and tear on bags and compare it with the expenses of grinding my own grain, it would pay me to borrow as much as $500.00 to get my own Grinder and Engine. Figuring the interest at $30.00 I would be money in pocket besides the many other things I could do with the engine, such as sawing, filling my silo, etc."

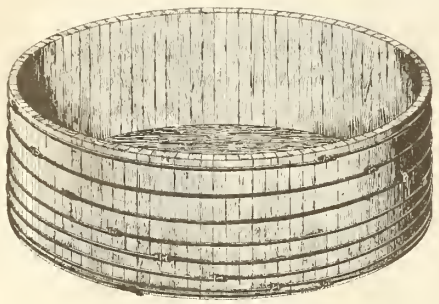
The Company manufactures an extensive and varied selection of Toronto Pumps to suit every requirement. It makes Lift Pumps and Force Pumps, some of which may be operated by hand, some by windmill, engine or electric energy, and some in combination of two or more of these methods. Some of those are suitable for shallow wells only, and others for deep wells only, and then others again combine both requirements. Inasmuch as pumping means continuous service on which depends the health and welfare of man and beast only first-class materials and workmanship are put into Toronto Pumps, Cylinders and accessories.

As regards well drills, the Company has long led in the introduction of the newest and most feasible methods of securing water, whether it was with the use of a hydraulic ram, in the creek, or drilling the earth's surface to extreme depths, and today its Chapman Well-Drill not only releases the imprisoned water, but with the water supply line so complete, it is delivered wherever it is required, whether it be to the watering trough on the prairie, or the locomotive on the Overland Limited, the kitchen of the suburban city home, or the thresherman's water-tank.

The Best in Silos.

Another specialty, of which mention should not be omitted, is the well-known "Toronto" silo, which con

verts the corn, the ears, the stalks, the leaves, into a most delicious mixture that the cattle enjoy. Nothing is wasted. It is made of wood. Cement is not only more costly, but draws moisture, which causes the ensilage to freeze. The ensilage will not stick to the walls of a "Toronto" Silo. It is air-tight. The staves are of double-tongued and grooved construction, carefully matched. This makes an air-tight container, so that the process of turning the corn into good ensilage can be carried out properly. A "Toronto" Silo is waterproof. Water rots ensilage. Each stave is treated with creosote, which resists water, rot and rats. Silage cannot get mouldy in a "Toronto" Silo. It has smooth inside walls. In Silos with corners or rough walls, the



One of the Company's Mining Tanks.

ensilage cannot settle properly. This causes air-pockets, resulting in spoilage. A "Toronto" Silo is built of 2" x 6" Double Tongued and Grooved Spruce—held together by 5/8" to 3/4" Wrought Iron Hoops with Malleable Lugs. A "Toronto" Silo will, therefore, stand the strain of wind and storm from the outside, as well as the immense pressure on the inside, for many years.

Steel Tower Flagstaff.

The Company is noted for its flagstaffs. The Toronto Steel Tower Flagstaffs follow the same type of construction as the towers used in connection with the Toronto Windmills. They are galvanized throughout, and will stand up against the strongest winds when properly erected and anchored. The Corners are made from 2½" x 2½" x ⅛" angle steel. The Braces are round, 5-16" diameter, and are adjustable. The Girts are 1¼" x 1¼" x ⅛" angle steel. The Pipe Staff extends 30 feet above top of tower, which allows plenty of space for flag.

THE YIELD OF OIL SHALES.

Chemists who have had occasion to report the results of assays of oil shale will probably be interested in the Alignment Chart which has just been published by the U. S. Bureau of Mines. This Chart, prepared by M. J. Gavin, L. C. Karrick and J. J. Jakowsky, gives in simple form the relations between the weight and volume of shale and shale oil. By the use of the Chart, it is easily possible to determine the yield of oil in gallons per ton of shale when the actual laboratory results are in terms of grams, ounces, or cubic centimeters. The whole operation consists of connecting two points on the Chart by means of a straight line and reading the desired result without further calculation.

Copies of the Alignment Chart for Determining Oil Yields in Assaying Oil Shale may be obtained free by applying to the Director, Bureau of Mines, Washington, D.C.

BRITISH GEOLOGICAL SURVEY CHANGES IN PERSONNEL.

The Summary of Progress of the Geological Survey of Great Britain and the Museum of Practical Geology for 1920 has just been issued.

In his introduction, Dr. J. S. Flett, M.A., D.Sc., LL.D., F.R.S., the Director, states that during the year 1920 changes on the staff of the Geological Survey were exceptionally numerous and important. In July Sir Aubrey Strahan, Director, and Mr. G. W. Lamplugh, Assistant Director (for England and Wales) retired after completing their service; Dr. Flett (Assistant Director for Scotland) was appointed Director, and Mr. J. Allen Howe (Curator of the Museum) became Assistant Director in Mr. Lamplugh's place. Dr. Walcot Gibson was promoted Assistant Director for Scotland, in succession to Dr. Flett. Dr. McLintock, of the Royal Scottish Museum, was appointed to succeed Mr. Allen Howe as Curator, but did not take up his duties before the close of the year. The staff was expanded by the appointment of six geologists, and Mr. Henry Dewey and Mr. Bernard Smith were appointed district geologists.

BOOK REVIEWS.

Oil Field Practice, by Dorsey Hager.

This little book, published in New York by McGraw Hill Book Co., contains information concerning American methods of developing oil properties. It deals with development of properties, production, transportation, wastes and losses, refining and valuation of properties. It is well written and amply illustrated and should prove serviceable. Mr. Hager is the author of the companion book "Practical Oil Geology," which has had a good reception.

A. S. T. M. Testing Standards.

We have received a copy of the 1921 edition of the Book of A. S. T. M. Tentative Standards, issued annually. This volume has just come off the press, comprises 518 pages, and contains 127 Tentative Standards as follows:

12 relating to Steel, Wrought and Cast Iron; 10 relating to Non-Ferrous Metals; 25 relating to Cement, Lime Gypsum and Clay Products; 12 relating to Preservative Coatings; 12 relating to Petroleum Products and Lubricants; 28 relating to Road Materials; 2 relating to Coal and Coke; 4 relating to Waterproofing; 4 relating to Insulating Materials; 4 relating to Shipping Containers; 10 relating to Rubber Products, 3 relating to Textile Materials; 3 relating to Miscellaneous.

By way of explanation, it should be said that the term "Tentative Standard" as distinguished from "Standard" is applied to a proposed standard which is printed for one or more years with a view of eliciting criticism, of which the committee concerned will take due cognizance before recommending final action toward the adoption of such tentative standards by formal action of the Society.

Those readers of the Mining Journal who are interested in engineering materials will find this publication of very considerable value.

Northern Ontario Letter

THE SILVER MINES.

In spite of the high quotations for silver, the production of metal from the Cobalt mines is not likely to increase before next spring. The Coniagas will be obliged to slow down to some extent during the winter, owing to the fact that it will be impossible to continue the re-treatment of sands during the cold weather. Mining and milling operations on ore from the mine, however, will continue unremittingly throughout the winter. A number of the closed down mines could operate profitably under present conditions, but would be under heavy expense were they to re-open at this season. Accordingly, it would appear as though general activity may be deferred until next spring.

Geological Studies at Cobalt.

Mr. Cyril Knight is completing a re-survey of the geology of the Cobalt field, this being the second year of work. It is understood the Ontario Department of Mines is desirous of completing the work this year, and Mr. Knight is working with this end in view. In the meantime, property owners are awaiting completion of the work, having in mind that a study of the report and map may be of value. It is generally admitted that a thorough study of geological structure is vital to successful mining, and with this in mind and knowing that the report will be the most complete ever compiled in connection with Cobalt, those owning property in close proximity to the producing mines are anxiously awaiting the time when the details may be made public.

Oxford Cobalt.

The shaft on the Oxford-Cobalt has reached a depth of 70 feet at which point the contact between the Keewatin formation with the underlying diabase has been penetrated. The vein is strong at this horizon and contains heavy cobalt mineralization. A feature of the composition of the vein is the presence of a small amount of quartz in which native gold is visible in small quantities.

Aladdin-Cobalt.

Work has been suspended on the Chambers-Ferland mine of the Aladdin-Cobalt Company. The reason for curtailment has not been officially announced, but it is understood to be the intention of the management to leave the mine closed for some time. All the employees were laid off this week with the exception of three.

The Aladdin has operated only on a limited scale during recent years, and is one of the companies which entered into the merger with the Tough-Oakes and Burnside Mine in what is now known as the Kirkland Lake Proprietary (1919) Ltd.

Nipissing.

The favorable developments on the new vein which was found in August on the Nipissing, and which has since developed into one of the more promising ore carriers on the mine, is being pointed to by the more optimistic as further evidence of what they claim to be a fact that some of the better known areas in the Cobalt field are as yet undeveloped and lie as an assurance of important mining activity for many years to come. The orebody lies in territory which is comparatively virgin and is in close proximity to other veins of promise which have not yet been extensively developed.

South Lorrain.

Unofficial reports from South Lorrain carry the information that a second high-grade ore shoot has been opened up at the 435-ft. level. Details of the find are lacking at the time of writing, but the vein is said to be several inches in width and containing wire silver and argentite. The mine is now a steady producer of high-grade ore as well as concentrates from the steady operation of its mill, while the physical condition of the property is stated to be the best in the country's history. The Keeley is controlled by the Associated Gold Mines of Western Australia, together with the firm of Ehrlich and Hamilton, London, England.

September Ore Shipments.

According to the regular monthly statement issued by Arthur A. Cole, mining engineer for the T. and N. O. Railway, there were 230.36 tons of silver ore shipped over the line from the silver mines of Cobalt and South Lorrain during the month of September.

The O'Brien was the heaviest shipper, with 71 tons, as shown in the following summary:—

Company	Tons.
Bailey Silver Mines	42.00
Coniagas Mines	43.55
Hudson Bay Mines	31.82
O'Brien Mines	71.00
Keeley Silver Mines	41.89
Total	230.26

A feature of the month's shipments was that half the ore went to the United States, the division being 112.89 tons to Canadian and 117.37 tons to United States Smelters.

During the period, the price of silver was at its lowest on Sept. 1st, being quoted at 62.500 cents an ounce on that date. It reached its highest mark on Sept. 27th, being quoted at 71.625, the average for the month being 66.150 cents.

Will Prospect in Quebec.

With a view toward looking into the possibilities of that area lying in the province of Quebec, lying to the east of Lake Temiskaming directly opposite the South Lorrain district, a syndicate is being formed in North Bay for the purpose of staking out claims in such parts of the district as are known to have favorable geology. The construction of an extension of the C.P.R. from Kipawa to Des Quinze has provided incentive to prospect this area in which it is known that diabase, conglomerate and keewatin formation occurs in certain areas. These comprising the syndicate are pointing to the similarity of the geological structure to that in Cobalt as well as South Lorrain.

Hudson Bay Mines.

According to the annual statement of the Hudson Bay Mines, Ltd., the company spent $37,765.50 during the fiscal year ended August 31st and realized an income of $17,418.10, thereby showing a loss of $20,347.10 on the year's operations.

During the period, bonds were issued for $35,000 which, with other liabilities and accrued interest amounts to $43,000 current liabilities. The loss and gain account shows a balance at credit of $96,591.31 after deducting the loss of the year under review.

The assets include $19,000 in bills receivable, $4,877.21 in accounts receivable, with $2,660.30 in ore at smelter and bagged at the mine. Outside such assets as

mine, mill and so on, as well as property at Gowganda and Kirkland Lake, the following investments are held:—Bonds in the Dome Lake Mining and Milling Company with accrued interest, $34,112.50; stock in the Dome Lake, $318,909.57, and stock in the Kirkland-Hudson amounting to $44,000.

The report shows that broken and blocked out ore in the old Hudson Bay mine amounts to 4,896 tons, estimated to contain about 48,960 ounces of silver. No estimate is made of a limited amount of low grade ore in the dumps or tailings.

Optimistic reference is made in regard to the company's property in the Kirkland Lake district and the directors express the belief that this may in due course be made to perpetuate the profitable existence of the Hudson Bay Company.

Peterson Lake.

A scheme has been decided upon by the Peterson Lake whereby silver certificates totalling $100,000 are to be issued in note form, in denominations ranging from $100 upwards. The company is stated to owe approximately $40,000 and is desirous of paying off this indebtedness as well as financing the re-opening of the mill. Low grade ore and sand tailings are estimated to contain over one million ounces of silver, and the management believes this material could now be handled profitably.

THE GOLD MINES.

Hollinger.

The big feature in connection with gold mining in Northern Ontario is that the Hollinger Consolidated has eclipsed all past records and handled over 4,100 tons of ore in a single day. The average, of course, is somewhat below this figure.

Premier-Paymaster.

The installation of a mining plant has been completed on the Premier-Paymaster and general mining operations are under way with a force of 30 men. This number will be increased in the near future. The Paymaster is made up of the old Standard Mine as well as some adjoining claims, comprising a total of about 175 acres and lying in the township of Delora just a short way south-west of the Dome Mines. Former work on the property consisted of sinking to a depth of 200 feet and with upwards of one thousand feet of lateral work. A good deal of encouragement is reported to have been met with.

Porcupine Crown.

It has been reported on good authority that the Porcupine Crown mine mill likely be re-opened just as soon as the complications with the Thompson-Krist interests can be adjusted. The Porcupine Crown is threatening to take action against the Thompson-Krist for alleged default in its obligations as outlined in the terms of consolidation. In the meantime, a meeting of the Thompson-Krist shareholders was held and an endeavor is to be made to have the matter adjusted.

Triplex.

Operators of the Triplex property, situated in the township of Shaw, are considering the question of making a small shipment of selected ore to the Ontario Government sampling plant at Cobalt.

Rochester.

Nothing of outstanding importance has so far been encountered by the Nipissing during the course of exploring the Rochester property by diamond drill. The property adjoins the Hollinger Consolidated on the north-west and has been under option to the Nipissing for $250,000 on the strength of its favorable location.

Power for Matachewan.

The question for development of hydro-electric power is a pivot around which interest in the Fort Matachewan district is swinging. Those in control of the chief water fall in the district, with which is identified Sutcliffe and Neelands of New Liskeard, are said to be prepared to proceed with development of energy provided they are assured of the cooperation of the mining interests. On the other hand, the Matachewan Gold Mines Company, which promises to be the leading mining operator in the district has adopted the attitude of desiring to develop hydro-electric energy on its own account.

Reports were recently in circulation that those who held the right to develop power were about to relinquish their hold, but these reports proved to be in error. Now, however, comes a report that the Matachewan Gold Mines Company has applied for the right to develop a small water power in the district. This power has been surveyed and is said to be sufficiently large to supply energy for the mine during its early stages of development, and the project may be commenced at an early date.

Porcupine V. N. T.

Some of the largest base metal mine operators in the world have representatives in the gold mining districts of Northern Ontario, with their attention directed particularly to the Porcupine and the Kirkland Lake districts.

These interests are especially desirous to secure gold mining property upon which the pioneer work has been done and which are in need of finances only to place them among the profit earners. Among these properties which one representative referred to with favor was the Porcupine V. N. T. where operations have been carried to a depth of 600 feet and with ore reserves variously estimated at around $1,000,000, and over half of which is of a grade which could be handled profitably even under the present high cost of operations. The property is equipped with a highly modern mining plant which is sufficiently powerful to carry work to a depth of 1,000 feet, as well as having a 100-ton mill. It is controlled in England, from where finances to resume work will perhaps not be forthcoming until next spring.

Kirkland Lake Output.

An output of upwards of $5,000 daily has been established by the producing mines of the Kirkland Lake district, and this rate is expected to be increased to about $8,000 every twenty-four hours before the end of the coming year.

The mines with mills are:—The Wright-Hargreaves, Lake Shore, Teck-Hughes, Kirkland Lake Mining Co., Tough-Oakes and Ontario-Kirkland. The first four are producing, while the Ontario-Kirkland is expected to join the list before the end of this year with the Tough-Oakes likely to fall into line next spring.

Among the newer properties in the development stage and which present good prospects of figuring among the producers of the future are these:—Orr Gold Mines

Sylvanite, Bidgood, King-Kirkland, Hunton-Kirkland, Wood-Kirkland, Lebel Oro, Kitchener Kirkland, and so on.

Other properties of outstanding promise include such companies as the Granby-Kirkland, Lebel Lode, Moffatt-Hall, Fidelity, Goodfish Lake, Canadian Kirkland, etc.

Montreal-Kirkland.

At a meeting of the shareholders of the Montreal-Kirkland held recently in Montreal a by-law was passed which authorizes the sale of 75,000 treasury shares at 25 cent per share. It is the intention of the company to instal a mining plant and resume operations as quickly as possible. The property lies immediately adjacent to the Ontario-Kirkland on the south.

Argonaut Gold.

Reports are current that the Argonaut Gold has succeeded in selling a large block of treasury stock, in which case the company may be financed to complete its development program. The Argonaut has considerable ore blocked out, but the management is determined to have the property thoroughly developed before launching out upon a considerable campaign. Provided the report of successful financial arrangements is correct, the enterprise offers promise of being numbered among the producing mines during the coming year.

Will Drill Pinelle Property.

Arrangements have been made to diamond drill the Pinelle property, situated along the boundary of Lebel and Gauthier. Tenders for from 5,000 to 10,000 feet of diamond drilling are being called.

Associated Goldfields.

It is learned authoritatively by the Journal representative that Dr. Mackay, president of the Canadian Associated Goldfields, has taken over the Costello-Thighe as well as the Costello-Lucy claim in the Larder Lake district, on which properties some genuine encouragement has been met with on surface. Assays taken at outcrop show gold in commercial quantities over a good stoping width, according to authentic advice. The result of underground work will determine whether or not these values are uniform.

British Columbia Letter

Zinc Production Increased.

Victoria, B.C.: The announcement that the zinc production of the Trail Smelter, Canadian Consolidated Mining & Smelting Co. this year will be the largest in the history of the plant has been received with much interest in British Columbia mining circles. The output is said to be nearly 50 per cent above that of last year. A market has been found in the Orient, important shipments having been made to the East recently thus relieving surplus stock situation.

Improvement in Copper.

Improvement in copper market conditions has made the mining situation in British Columbia much brighter. There are a number of important projects in view, which are likely to assume definite shape as soon as it is assured that better times have come to stay. A large concentrating plant is proposed for Anyox, the smelting centre of the Granby Consolidated Mining & Smelting Co. There is the new mill of the Britannia Mining & Smelting Co., Britannia Beach, as well as the proposed new mills at the Sunloch and Old Sport Mines, Vancouver Island, to be constructed by the Consolidated Mining & Smelting Co. Ltd. Besides, there is no doubt that operations will be renewed on a substantial scale at the Copper Mountain Mine, Princeton, while the Iron Mask at Kamloops and many similar properties now idle will become active.

Changes Probable in Taxation.

Coincident with the present revival of all phases of mining in the Province is the effort being made by Operators to induce the Government to reduce its present system of taxing the industry. Reference already has been made to this movement, but it may be added that, within the past few days, a further delegation headed by Mr. J. J. Warren, President of the Canadian Consolidated Mining & Smelting Co. Ltd., has waited upon the Provincial Government and advanced strong arguments in support of their position in regard to taxation. While it is impossible to say at the moment what the outcome will be, there is no doubt that the authorities are disposed to be friendly and to look with favor upon at least some of the recommendations made. There is a possibility, therefore, that changes of importance may be provided for during the present Session of the Provincial Legislature.

That the mining industry must bear its fair share of the financial burden of the country is the principle upon which both Government and the mining operators agree. In the past differences have arisen as to the just and equitable interpretation of the words "fair share". The Premier and the Minister of Mines and their Colleagues may be said, however, to be unanimous in the belief that it is of first importance that capital should be encouraged to invest in the mining industry of the Province, and that the surest way to obtain this result is the enactment of a taxation policy, not too heavy, capable of being easily understood, and easily administered and assured of permanency over a period of some years.

Moose and Last Chance.

Alice Arm, B.C.: A small crew of men is to be kept at work on the Moose Mine during the winter. Development will consist of cross-cutting the ledge in the lower tunnel. As ore bunkers have been built, other equipment installed, the property will be in good shape for the operations of next summer. The Last Chance Group is said to be showing up well. Ore has been traced on the surface for about 1000 ft., 300 ft. of stripping has been done on one point on the lead which shows the ore body to be about 70 ft. in width. The Last Chance joins the Moose Group.

Granby Bay Polytechnic.

Anyox, B.C.: There has recently been established at Anyox with the support and approval of the management of the Granby Consolidated Mining & Smelting Co. an Institution known as the Granby Bay Polytechnic. This will give an opportunity to the young people of that mining community to obtain a knowledge of mineralogy, metallurgy, etc. At the inaugural meeting Mr. H. S. Munro, General Manager of the Company gave the educational enterprise his unqualified endorsation.

Reno Gold Mines.

Nelson, B.C.: The Reno Gold Mines, Ltd. of Sheep Creek has been incorporated with a capital of one million dollars. The officers are: W. B. Pool, President

& General Manager; Thomas Kilpatrick, vice-president; Clarence Pool, traveller; James O'Shea, Secretary & Solicitor; Michael O'Donnell, Director and Superintendent of development work.

Rescue of Miners at Britannia Mine.

Britannia Beach, B.C.: L. C. Craig and Francis Patenaude miners entombed in the Britannia Mine for eight days, have been rescued. They were reached after gangs of men had worked continuously in six hour shifts, under conditions that were very trying and at times extremely perilous. The men had been without food, and their water was obtained from a trickle that was directed from the roof down a stick of timber. Notwithstanding the physical and nervous strain to which they had been subject, both men were found in fairly good condition. They were also able to walk from the mine with only slight assistance, and since have completely recovered their strength.

The Disaster at Britannia Beach.

Not many hours after these miners were brought to their homes a cloudburst occurred, and the little town of Britannia Beach suffered a disaster, the full extent of which in life and property has not yet been measured. The number of deaths has not yet been officially announced, but it will total at least 38, and some newspaper reports computed it around 50. The mining community of Britannia Beach is situated on Howe Sound at the base of the mountain in which is the mine of the Britannia Co. Near the summit of this mountain there is a dam with a capacity of five million cubic feet of water. When the contents of this reservoir were let loose, therefore, it meant that 150,000 tons of water fell a distance of 4000 feet directly upon the clustered homes of the Company's employees. No further explanation of the disastrous consequences need be made because the results of such a combination of circumstances must be clear to any intelligent person. The Britannia Company appears to have been pursued by an imp of ill fortune. In 1914 a huge rock slide wrought destruction, and more recently there was the fire that almost completely demolished the mill and other plant. Plans now are under way for the reconstruction of the latter, and the actual building was to have commenced very shortly. It will now be necessary to erect a new, not only plant and housing for the same, but homes for officials and workers.

Yukon Gold Production.

Vancouver, B.C.: The Dominion Assay Office receipts for the month of October were the largest for any month of the current year, amounting to nearly $400,000. The greater amount came from the Yukon, although that from British Columbia Camps was above double for the corresponding period of last year. The Yukon production is nearly 10 per cent over the corresponding month of last year. The total receipts are about $500,000 greater than was the case for the first eight months of 1920.

NEW DISCOVERY ON KENO HILL.

It is reported from Dawson that a rich new vein of silver ore has been discovered on Keno Hill by Mr. Bussey, who is in charge of work on claims now under bond to the Slate Creek Co.

TORONTO MINING QUOTATIONS.

Quotations on Active Stocks on Standard Stock Exchange on 8th November, 1921.

	High	Low	Last
Silver.			
Adanac Silver Mines, Ltd.	1½	1½	1½
Beaver Consolidated	23½	21	21
Chambers-Ferland	4¾	4¾	4¾
Coniagas	1.20	1.20	1.20
Crown Reserve	12	12	12
Gifford	½	⅜	⅜
La Rose	34	32	34
McKin.-Dar.-Savage	19	18	18
Mining Corp. of Can.	1.15	1.10	1.10
Nipissing	5.75	5.35	5.60
Ophir	1	1	1
Peterson Lake	5½	5	5½
Temiskaming	26	22	26
Trethewey	12¾	11	12¾
Wettlanfer Victory	26½	25½	26
Gold.			
Apex	1	1	1
Atlas	20½	15½	19½
Dome Extension	68	68	68
Dome Lake	6¾	6¾	6¾
Dome Mines	20.05	19.30	19.75
Gold Reef	2	1⅝	1⅞
Hollinger Cons.	7.55	7.48	7.49
Hunton Kirkland G.M.	9	7½	7¾
Keora	11	9¾	9¾
Kirkland Lake	30½	26¼	26½
Lake Shore M. Ltd.	1.25	1.21	1.21
McIntyre	1.90	1.87	1.87
Moneta	9	8¾	8¾
Newray Mines, Ltd.	4	4	4
Porcupine Crown	15	13¼	13½
Porcupine V. N. T.	16¾	15	16
Schumacher	23½	22	22
Teck-Hughes	15½	15	15½
Thompson Krist	2	2	2
West Dome	6⅞	5½	6½
Wasapika Gold M. Ltd.	3⅞	3⅝	3¾
Miscellaneous.			
Bothwell Oil	7	6	7
Petrol Oil	20	18	18
Rockwood Oil, Gas	½	⅜	⅜
Vacuum G.	2¾	2	2¾

METAL QUOTATIONS.

Following are the fair average price for ingot metals (in less than car-loads):

Toronto.	Cents per lb. 8th Nov. (Unchanged since last week).
Copper, Electric	17
Copper, Casting	16¾
Tin	35
Lead	6¾
Zinc	7½
Aluminum	27
Antimony	9

Mr. P. A. Robins was in Toronto last week.

Mr. C. E. Foster is at Gondreau, Ont., making preparations for developing the Murray property.

The Canadian Miners' Buying Directory.

Acetylene Gas:
Canada Carbide Company, Ltd.
Prest-O-Lite Co. of Canada, Ltd.

Acetylene Welding:
The Toronto Iron Works, Ltd.

A.C. Units:
Powley & Townsley, Limited.

Agitators:
The Dorr Co
Can. Chicago Bridge & Iron Co., Ltd.
Horton Steel Works, Limited.

Air Compressors:
Belliss & Morcom, Ltd.
Laurie & Lamb

Air Hoists:
Canadian Ingersoll-Rand Co., Ltd
Mussens, Limited.

Air Receivers:
The Toronto Iron Works, Ltd.

Alloy and Carbon Tool Steel:
Peacock Brothers Limited.

Alternators:
MacGovern & Co.

Aluminium:
Spielman Agencies, Regd.

Amalgamators:
Northern Canada Supply Co.
Mine and Smelter Supply Co.
Wabi Iron Works.

Antimony:
Canada Metal Co.

Antimonial Lead:
Pennsylvania Smelting Co

Assayers' and Chemists' Supplies:
Dominion Engineering & Inspection Co
Lymans, Limited
Mine & Smelter Supply Co.
Pennsylvania Smelting Co.
Stanley, W. F. & Co., Ltd.

Ash Conveyors:
Canadian Link-Belt Company

Ashes Handling Machinery:
Canadian Link-Belt Co., Ltd.

Assayers and Chemists:
Milton L. Hersey Co., Ltd
Campbell & Deyell
Ledoux & Co.
Thos. Heys & Son
C. L. Constant Co.

Asbestos:
Everitt & Co.

Balls:
Hull Iron & Steel Foundries, Ltd.
Peacock Brothers Limited.
The Wabi Iron Works.
The Hardinge Conical Mill Co.
The William Kennedy & Sons, Ltd.

Ball Mills:
Hardinge Conical Mill Co.
Hull Iron & Steel Foundries, Ltd.
The Wabi Iron Works.
The William Kennedy & Sons, Ltd.

Babbit Metals:
Canada Metal Co.
Hoyt Metal Co.

Ball Mill Feeders:
Hardinge Conical Mill Co.
Hull Iron & Steel Foundries, Ltd

Ball Mill Linings:
Hardinge Conical Mill Co.
The William Kennedy & Sons, Ltd.
Peacock Brothers, Limited
Hull Iron & Steel Foundries, Ltd

Belting—Leather, Rubber and Cotton:
Canadian Link-Belt Co., Ltd.
The Mine & Smelter Supply Co.
Northern Canada Supply Co.
Jones & Glasco.

Belting:
R. T. Gilman & Co
Gutta Percha & Rubber, Ltd.

Belting—Silent Chain:
Canadian Link-Belt Co., Ltd.
Hans Renold of Canada, Limited, Montreal
Jones & Glassco (Regd.)

Belting (Transmission):
Goodyear Tire & Rubber Co

Belting (Elevator):
Goodyear Tire & Rubber Co

Belting (Conveyor):
Goodyear Tire & Rubber Co
Gutta Percha & Rubber, Ltd.

Bins and Hoppers:
The Toronto Iron Works, Ltd.
Can. Chicago Bridge & Iron Co., Ltd.
Horton Steel Works, Limited.

Blasting Batteries and Supplies:
Canadian Ingersoll-Rand Co., Ltd
Mussens, Ltd.
Canadian Explosives, Ltd.
Powley & Townsley, Limited.

Bluestone:
The Consolidated Mining & Smelting Co
The Coniagas Reduction Co., Ltd.

Blowers:
Canadian Fairbanks-Morse Co., Ltd
Northern Canada Supply Co.

Boilers:
Canadian Ingersoll-Rand Co., Ltd.
Marsh Engineering Works
R. T. Gilman & Co.
The John Inglis Company
Wabi Iron Works.

Blue Vitriol (Coniagas Reg):
Canadian Fairbanks-Morse Co., Ltd.

Bortz and Carbons:
Diamond Drill Carbon Co.

Boxes, Cable Junction:
Standard Underground Cable Co. of Canada, Ltd.
Northern Electric Co., Ltd.

Brazilian Rough Diamonds:
Diamond Drill Carbon Co.

Brazilian Mica:
Diamond Drill Carbon Co.

Buggies, Mine Car (Steel)
Hendrick Manufacturing Co.

Brazilian Balias:
Diamond Drill Carbon Co.

Brazilian Rock Crystal:
Diamond Drill Carbon Co.

Brazilian Tourmalines:
Diamond Drill Carbon Co.

Brazilian Aquamarines:
Diamond Drill Carbon Co.

Bridges—Man Trolley and Rope Operated—Material Handling:
Canadian Mead-Morrison Co., Limited

Bronze, Manganese, Perforated and Plain:
Hendrick Manufacturing Co.

Buckets:
Canadian Ingersoll-Rand Co., Ltd.
R. T. Gilman & Co.
Hendrick Manufacturing Co.
Canadian Link-Belt Co., Ltd.
Marsh Engineering Works
Mussens, Ltd.
MacKinnon Steel Co., Ltd.
Northern Canada Supply Co.
The Wabi Iron Works

Buckets, Elevator:
Canadian Link-Belt Co., Ltd.
Hendrick Mfg. Co.
Peacock Brothers Limited.

Cable—Aerial and Underground:
Canada Wire & Cable Co.
Northern Canada Supply Co.
Standard Underground Cable Co. of Canada, Ltd.
Peacock Brothers, Limited

Cableways:
Canadian Mead-Morrison Co., Limited
Fraser & Chalmers of Canada, Ltd.
Mussens, Ltd.
The Wabi Iron Works
R. T. Gilman & Co.

Cages:
Canadian Ingersoll-Rand Co., Ltd., Montreal, Que
Northern Canada Supply Co.
Fraser & Chalmers of Canada, Ltd
The Electric Steel & Metals Co.
The Mine & Smelter Supply Co.
Mussens, Ltd.
The Wabi Iron Works

MR. FORD MYSTIFIES.

During the recent visit of Mr. Ford to his iron ore property he was attracted by the old hoisting drums that were on the property and he ordered them shipped to Detroit, as he also did a gasoline engine that was purchased from the White Pine plant of Calumet & Hecla Copper Company. Another old relic that he wanted and purchased was the old air compressor at the Beaufort mine, located not far from the Imperial. It was installed at the Beaufort in 1882 and was second-hand when secured at that time. It was of five-drill capacity and when in operation could be heard as far as a flock of Ford tractors with mufflers lacking. Just what Mr. Ford wants with these old machines he did not state, but they were all being loaded on a car for shipment to him when we were at the mine this week. Evidently he has some idea as to what use he is going to make of them.

ACCIDENTS IN U.S. MINES.

Accidents in the year 1920 at all mines, quarries, coke-ovens and metallurgical plants (except iron-blast furnaces) in the United States caused the death of 2,973 employees and the injury of 206,000 others, according to the United States Bureau of Mines. In these industries 1,088,000 men were employed last year, who worked a total of 279,400,000 shifts, an average of 257 working days per man. Accident rates based upon a standard of 300 working days to the year show that for every thousand men employed 3.19 were killed and 221.25 were injured. For 1919 the corresponding rates were 3.63 killed and 219.33 injured. These figures do not take into account the large number of slight injuries causing a loss of time of less than one day.

BLAZED NEW TRAIL.

Dawson: Dr. W. E. Cockfield, Dominion geologist, who has been in the field in the Mayo district since early in the summer, arrived here on the Casca. He and his party spent the summer in geological work on Stand-To Mountain, Rambler Hill and Mount Cameron, and, starting the first of September, crossed the country blazing a trail from Mayo to the Pelly river. The doctor reports that the work on Stand-To, Rambler and Cameron included the mapping of each place and geological examinations, which will be reported in detail in the official geological publications. He will return from Dawson to Ottawa direct, and will put in the winter there working up his field notes and preparing his reports.

TORONTO COAL PRICES.

Toronto, 8th Nov.—There is little question about the fact that the situation in Toronto looks pretty bad for the coal men at the present, so far as bituminous coal is concerned. The price of slack is between $5.75 and $5.95, and that of lump from $7.00 to $7.25 a ton. In both cases the prices named are in Toronto in Canadian funds. But there is little demand. For the moment, the market is glutted, and, though the surplusage, due to circumstances indicated last week, is not relatively large, it is not being absorbed. In fact, one coal man in a very large way of business put the situation thus to the writer: "You can't give coal away in Toronto today." The market in the United States, it may be mentioned, is also very slow and soft. The present is a good time to buy, for with the cold weather coming along, prices will probably stiffen up a bit. But, at present, things are about as quiet in the bituminous coal line, as they could well be.

PERSONALS.

Mr. A. L. Parsons has been elected chairman and Mr. Ellis Thompson secretary of the Toronto Branch of the Canadian Institute of Mining and Metallurgy. The branch held two meetings during October and will hold a series of meetings during the winter months.

Mr. A. Young is in charge of explorations of the Burke property at Shiningtree.

President Schley of the Howe Sound Co. is at Britannia Beach making arrangements for the rebuilding of the town destroyed by flood. A new site will be chosen close to the old one.

Mr. Robert Mackay, a Toronto lawyer who died suddenly last week, was well known among the mining fraternity. He took an unusual interest in engineering projects, particularly in power development and distribution. He was an authority on mining law and several mining companies had his advice on legal matters.

Mr. Geo. Gray, manager of Canadian Associated Goldfields, was in Toronto last Saturday.

Mr. Arthur W. Jenks is examining mining properties in Northern Ontario.

Mr. C. B. Smith of Rossland has been visiting his old home in Michigan.

Mr. J. L. Agnew of Copper Cliff is in New York for a few days.

EDITORIAL

PROSPECTORS AND PROPERTIES.

Last week, in connection with the question of the tariff in its relation to the mining industry, we took occasion to emphasize the absolute necessity, in the national interest, of an enhanced development of our natural resources. We pointed out that, of such natural resources, Canada's mineral resources form a unit of great and increasing importance, by reason alike of their present position and of their future potentialities. And we gave it as our own view, in connection with the framing of a tariff in relation to mining machinery and machine parts, that every encouragement possible should be afforded the mining operators, but not at the expense of manufacturing industries already established and endeavoring to serve the country well.

In short, it is our opinion that it is possible, and would be found practicable in a tariff wisely and understandingly framed, to provide for duty-free importation of such mining machinery and machine parts as are not manufactured in this country, without working any hardship to manufacturers of mining machinery already in existence or diminishing their profits in the lines they are handling. Such duty-free importation as this would unquestionably tend to increase mineral production. And anything that tends to that end, without adversely affecting other legitimate interests, is, in the highest degree, desirable.

In this connection, we may mention another matter which is, possibly, not without a substantial bearing on this important question of increased mineral production. In Canada, and certainly not least in Northern Ontario, the mineral-bearing lands present singularly rich, if not almost illimitable, possibilities. But there is urgent need of their development on an ample and adequate scale. Anything that tends to retard such development necessarily hinders that increase in mineral production which, it is agreed on all hands, is so eminently desirable. Now, the question arises. Are prospectors doing what they should do to advance the progress of our mineral-bearing areas? Or are they, on the contrary, assuming an attitude calculated to hinder, rather than to hasten, the development of our mineral resources on a fit and proper scale?

The other day, a New Yorker, said to be well known in mining circles on both sides of the line, visited the gold-bearing areas of Northern Ontario, and subsequently, stopping off at Toronto, on his way home, gave expression to his impressions of what he had seen in the North. He was, naturally, very enthusiastic as to the future of Ontario's gold-bearing lands, and particularly of those in Porcupine and Kirkland Lake districts. But he was certainly the very reverse of enthusiastic with regard to the figures that prospectors are asking for their claims. "To my mind," he said, "the chief obstacle to a gold boom in the Dominion, the like of which has rarely been seen in the world before, lies in the ridiculous figures that are being placed upon properties in the north country by the prospectors. One of them offered me a parcel of land comprising four claims for the small sum of $675,000, and told me that if I would not buy it at that figure he knew where he could find another, and an anxious, purchaser. Now, a man like that has lost all his ideas of value. But he was not by any means alone in his extravagant notions. Most of the prospectors around Kirkland Lake are fit candidates for Matawan, and until their proposals are infused with more elements of sanity the progress of your north country will be permanently retarded."

Now, to this question, and to others, there is more than one side. No doubt, some prospectors do ask exorbitant figures for claims—although, by a sort of "custom of the country", the initial figure asked is not always—is, in fact, perhaps, rarely—the figure at which a deal is actually closed. The prospector knows full well that, whatever figure he asks for his claim, the attempt will invariably be made to beat him down. Consequently, in naming a figure, he makes allowance, be the same more or less, for the beating-down process. On the other hand

there are promoters who want to acquire prospectors' holdings at almost a nominal figure. Their idea of the equity of things is that they should get all the fat and the prospectors a very diminutive slice of the lean.

Nobody can be more alive than we are ourselves to the patent and obvious fact that capital is greatly needed both for the development of properties upon which no work has been done hitherto, and also for the more complete development of properties upon which work is now under way. Nor are we ever inclined to be unmindful of the risk and uncertainty which, in practically every mining venture, necessarily attach to the development stages. But it must be remembered that all the risk and uncertainty does not fall to the promoter. The prospector has his share. It may be that, in a figure which, at first sight, may seem high, and even unreasonably high, in comparison with the work which he has done on the property in question. But, very possibly, the prospector has spent years of effort on other claims which have turned out devoid of promise. Those fruitless labors have to be taken into account when he is fixing his price for a property which affords a good prospect of turning out to be a really good thing.

In a word, these must be present the spirit of "give-and-take" in the relations between prospector and promoter. An irrational, "dog-in-the-manger" attitude on the part of either is certainly inimical to that speedy development of our mining areas and that rapid progress of our mining industry to which it is to the best interests of both to contribute.

A MILL FOR SMALL MINES.

In an article on methods of treating gold ore on the Rand, Mr. G. A. Denny and Mr. T. S. Denny, suggest in the "Mining Journal", that a combined ball and pebble mill may prove feasible for treating ore at small mines.

Their investigations satisfy them that tube mills can be advantageously used for both coarse and fine grinding, and that one tube mill, divided by a partition and loaded, in one part with large grinding balls, and in the other with pebbles or their equivalent, would do the work of crusher, stamp mill and fine grinder. By circulating cyanide solution through the mill it becomes also a cyanide plant. Such a mill could be fed with ore up to 5 inch cubes.

The writers claim that while all this sounds fantastic it is quite feasible. Means for separating and washing the pulp free from gold-containing cyanide solution would have to be provided.

In the interests of gold mining it is to be hoped that machinery will be devised that will permit the operation of small properties, without the necessity of the heavy outlay for plant that is now required. More attention is needed to be given to the problem of making gold properties productive on a small scale, while the possibilities of operating on a very large scale are being determined. We frequently have enquiries concerning some such machine as is suggested by Denny Brothers, and there can be little doubt that the perfecting of such a device would help the growth of the gold mining industry in Canada.

STAMPS IN FAVOR OF THE RAND.

While there are metallurgists who consider that the stamp mill is to be forced out of a place in the treatment of gold ore, it is worth noting that stamps are still being used at all the gold mines on the Rand, and that they are in recently built mills as well as in the older ones. Stamps have done such good service on the Rand that advocates of other methods of crushing gold ore have not been easily able to convince the operators that they could save money by installing other machinery in place of the stamps. In Ontario it has been not so difficult for the ball mill manufacturers to bring their machines into favor.

THE POWER SITUATION.

Our Cobalt correspondent, on another page, deals with some features of the power situation at Porcupine. He attributes the long delay on the part of the Ontario Government to the fact that there are conflicting interests. He intimates also that a possible cause for lack of progress in providing power is the doubt on the part of the power company as to what the mining companies are going to do.

That there are conflicting interests is no excuse for inaction. Careful consideration is necessary because of the conflicts of interest, but there is, as yet, little evidence that the attention necessary is being given to the problem. If the importance of providing more power for the mines were appreciated by the Government, there would have been some progress made in the matter by this time. An active leadership is required to get the different interested parties working together on a northern development plan.

In connection with this subject, the Northern Miner, of the 12th instant, after stating that there would be no power shortage this winter at Porcupine, goes on to ask: "But how about the future? Suppose that before next winter rolls around the three main mines have added to their power usage by 50 per cent. Suppose that instead of three customers, as at present, the company has six or seven big takers of energy, something not at all improbable. What is the Power Company going to do?

"The Power Company to that question will say: If Hollinger goes off by itself and develops its own energy, leaving us with 50 per cent. of our power on our hands, why should we or the lesser mines worry about the future. We will have all the power they want; and it would be foolish for us to spend money on new dams and powerhouses when our biggest customer threatens to leave us.

"McIntyre, which secured the power rights on the set of falls on Mattagami River, naturally hesitates to plunge into the expense of power development when there is a chance that it will be able to get all its needs

supplied from the private company's source. President Bickell is not going to throw his company into heavy power supply capital expenditures if these can be avoided.

"Therefore the whole situation at Porcupine appears to revolve around Hollinger.

"It is pretty hard to find the answer. Porcupine mining men should be spared censure if they venture to surmise that the suit, involving several hundred thousand dollars, that Hollinger brought against the power company alleging that damages were sustained through the power shortage last winter, is not a factor in to-day's situation at Porcupine and that neither side is asleep as to the possibilities."

SCIENTISTS WILL MEET IN TORONTO.

At the invitation of the University of Toronto and the Royal Canadian Institute, the annual meeting of the American Association for the Advancement of Science is to be held this year in Toronto. This will bring to Canada, during Christmas week, a large number of scientists, and the exchange of ideas will, no doubt, be fruitful. The Association has become affiliated with many scientific societies and its interests are many; but in them all the object is the promotion of science.

The members of the Association have made many contributions to industry, and it may confidently be anticipated that the coming meeting will result in the dissemination of useful knowledge. Those engaged in mining will be particularly interested in the doings of the engineering and geology sections of the Association. All who attend such meetings find something instructive and interesting there, and it is an opportunity that should not be overlooked by any who can arrange to be present. The application of science to industry is not the special object of such meetings; but there are many members of the Association who are making contributions to industry by their scientific work. Some of the sessions will be found of much interest to those who are more concerned with the application of science than with the study of it.

The meetings of the Association are generally held in the larger American cities, and Canadians have seldom had the opportunity of attending a meeting in this country. It is to be hoped that the enterprise of those who are in charge of the Toronto meeting will bring together many Canadians scientists to meet the American scientists.

EDITORIAL NOTES.

Wright-Hargreaves Mines Ltd. has declared a dividend of five per cent payable January 1, 1922. The directors are to be congratulated on the success of their enterprise. We hope that the company will long continue to operate profitably. It has a good property, well equipped, it should do well.

That there will be some activity in the Goudreau gold area this winter is indicated by reports of arrangements being made for development of the Murphy property. Mr. C. E. Foster, who has taken up the property under option has been a pioneer in many Ontario mining districts.

The receipt of an order for rails for the Canadian National Railway has improved the situation of the steel mills in Nova Scotia and Ontario. The coal mining industry will also benefit in the case of the Nova Scotia companies.

The wage question in Nova Scotia has to be gone into carefully by employers and employed. It is to be expected that negotiations will find both sides ready to make some concessions in order to make business possible. As has been stated in England, "wages must be cut or there will be none to cut."

The October statement of Nipissing mining company should be pleasing to shareholders. The development work on the new vein had not such good results as during the previous month but, as the manager remarks, "it was satisfactory." The October output was valued at $258,768.

The Canadian Light Railway Company has announced that it will push the building of the railway to serve mining districts tributary to the Ontario Government Railway. This should soon help development of the area east of Swastika.

MOVEMENTS IN SILVER.

Messrs. Samuel Montagu and Co., of London, Eng., write, with reference to recent sharp movements in silver, in part as follows:—

Many would be glad to know the reason for these changes, which are not heralded by any warning. To gain it, we must look below the surface, and reach the speculative forces which sway silver and many other commodities, as well as the foreign exchanges. For some time past no stable ground has been under our feet in the world condition of affairs. On the whole some slight amelioration is taking place, but currency inflation, exaggerated prices for goods, and the legacy of under left by the war, afford great room for snatching profits—and also incurring losses—by gambling in any counters that are ready to hand. Among other commodities, silver has been selected for the purpose, and the fact that it governs, or is governed by the Far Eastern exchanges, renders it specially suitable; for it can be dealt in as a counterpoise to operations in the China exchange. Hence, given large unexpected sales or purchases upon a rather indifferent silver market, quick falls and rises in the price are only to be expected. Forecasts as to prices in the near future are therefore futile in the circumstances to which we have alluded. India seems for the time being to have ceased acquiring the metal, and competition between her and China is therefore absent, but there appear to be two classes connected with China holding diverse views, and not infrequently they operate here either on the same day or some day not far apart. To them is principally owing the irresolution of the market. At the same time silver is being actually shipped to China.

The Porcupine Power Controversy

(By J. A. McRAE).

Quite a controversy has developed with respect to the question of the development of hydro-electric energy for use in connection with mining operations in the Porcupine district.

It has been intimated by writers of mining news that the Ontario Government has not given the Hollinger Consolidated due encouragement to develop energy, and it has been stated that the Temiskaming and Northern Ontario Railway is unreasonable in making reservations of rights to develop energy in a certain section of the country "when the Government through the T. and N. O. Railway has neither the demand for such development nor the finances with which to carry it into execution."

The point is generally admitted that although there is at present sufficient power for industrial needs, yet so close is consumption to maximum generating capacity that new mining enterprise or proposed enlargements on the present operating mines must be held in abeyance pending the development of more energy. This is a serious situation, particularly at a time when it behooves all to encourage industrial progress where ever possible.

In regard to the T. and N. O. Railway's position, the writer interviewed Chairman George W. Lee. The chairman declared that the Commission is wishful to co-operate with the mining industry and is vitally interested in seeing maximum progress. He stated that the electrification of the entire Government-owned T. and N. O. Railway would eventually take place and that the reservations made for this purpose would not interfere in any way with the development of energy for industrial use. "You may be assured of this," said the Chairman, "that the T and N. O. Railway will encourage industry throughout the whole field which it serves, but, at the same time, will so conduct its affairs that when electrification takes place it will be through development of its own energy on its own account and not by paying enormous tolls to private power concerns."

This leaves the T. and N. O. Railway out of the controversy, in that the reservations made by the Government for electrification purposes are at a point from where the mines would probably not develop or draw energy at present even though permission were available.

The question, therefore, seems to simmer down to one in which the mining companies and the Northern Canada Power Company are concerned. There is the added possibility of a conflict of interests between the Hollinger Consolidated Gold Mines with the Abitibi Power and Paper Company in connection with the development of power on the Long Sault Rapids on the Abitibi River. If this conflict exists, it will probably require some little time to adjust, and, as is well known, the present Ontario Government has already tasted too much of the bitter sweet of arbitrary measures and may this time be pardoned for acting with due caution.

Relief is possible in the immediate vicinity of Porcupine, either through increased development on the part of the Northern Canada Power Company or through the development of Sturgeon Falls on the Mattagami River, the rights to harness which are held by the McIntyre-Porcupine.

Last week it was stated that the Northern Canada Power Company stands prepared to develop energy for the full demand of the producing mines of the Porcupine districts, but is unwilling to launch out into too expensive a program until being assured of securing the business of supplying the full requirements of the mines. This statement was misinterpreted in some circles as inferring that the power company was not certain that more power was needed. As to this, the correct interpretation is that the power company is afraid to spend a lot of money on power development until being assured that before such time as such development might be completed, one or another of the leading mining companies might decide to go ahead with power development on its own account, thereby leaving the private concern with a white elephant on its hands.

With these facts in minds, co-operation between mines and power company was urged. That is to say: The mining companies could secure a show down by placing all their cards on the table—secure from the power company a statement of how much energy they can develop and when. In the event of this being inadequate, the development of power through some other source would become a necessity.

NEW STRIKE AT KEELEY.

The other day, miners at the Keeley, in South Lorrain, while drifting on the Woods vein at the 400 foot level, broke into material of extraordinary richness, according to the Northern Miner. The ore is a foot in width and runs about fifty-fifty calcite and silver in spots. Reports are that the material is continuing. Four weeks ago they struck rich showings of wire silver, with argentite, at the junction of the Woods vein with another vein. This is directly below the new find on the 400, and in a winze at the 435 foot level. This has been worked on steadily, and is standing up. Both these finds are in the Keewatin, an undetermined distance from the contact.

ALPINE AMPLY FINANCED.

At the Alpine property in Gowganda $3,500 a month is being expended, says the Northern Miner, and the operation is at the present time the second largest in the camp. It is learned officially that the company has been financed lately with sufficient money to demonstrate the merits of the property. Chicago capital, from strong sources, has become interested.

The Alpine is equipped with a complete set of camps and other buildings. The plant is adequate for the scope of operations planned.

During the past summer most of the effort has been centred on opening up surface ore showings, and this work resulted in increasing the good chances of the company. The main vein has been traced for 900 feet and open cut for 400 feet. Other veins have been disclosed and worked. Values are reported as very satisfactory.

Previous work included a tunnel 600 feet in length. The company will prolong this tunnel now that surface work is over for the year, carrying it forward for the purpose of picking up and connecting the veins found on surface. This tunnel is now about 200 feet below surface.

Light in the Mine

Its Bearing on Accidents and Reduced Costs.

The mine casualty list is said to be on the up-grade during the present year. Moreover the economy in the use of stores is more pronounced than ever before on the mines of the Witwatersrand. Is it not just possible that there may be some connection between these two occurrences, that a two severe economy in the use of mine stores may conceivably lead to a heavier accident roll and as a consequence to an increase and not a decrease in the actual cost of mining? This is not by any means a plea for relaxation of control in the allotment of mine stores, nor for the issue of such stores, without full and careful inquiry as to the necessity for such issue. It is more particularly the purpose of this article to consider whether, in the desire to cut down mining costs it may not be possible to proceed too far in such a direction and thus to defeat the end in view. We have all heard of the man who tried a restrictive diet on his horse and what became of it. It may be equally useful to consider whether in the matter of illumination the desire for economy has not resulted in an addition to, and not a subtraction from, the costs of mining.

Given that the other things are equal, the better the light is the better is also the work performed. We all know that in fiery coal mines the need of safety lamps with their feeble lighting effects has resulted in the creation of a new industrial disease known as astygmatisis, affection of the eyes which prevents miners from following their occupations. It was proved in Great Britain that where mines changed over from open lights to locked lamps the accident rate was also raised and that the cost of mining was increased: this was conclusively proved by statistics published by the Home Office; and it also affected the rates of pay given for coal cutting, a higher price per ton being paid to the collier when using safety lamps than when using open lamps or candles, because it was found that the earning power of the miner was directly affected by the absence of light in his working face.

There has never been a thorough investigation into the minimum amount of light essential to safe and economical working of the Witwatersrand gold mines. It is scarcely too much to assert that the adequate lighting of the mine has not figured in any inquiry relative to working costs. In most cases the prominent factor has been how to reduce the consumption of candles and carbide so as to make an apparent reduction in cost of stores, and this without any reference to the vital bearing on costs of the absence of a sufficient amount of light throughout the mine.

We hear much about organisation as applied to the working of the Rand mines, but where is the organising power which takes no account of the lighting factor in mine costs? As an actual fact it does not exist. Each mine is a law unto itself so far as it arrangements for lighting are concerned. We know that a co-ordinated plan exists for the watering of the working faces, etc., in each mine, and as this is enforced by statute it may be assumed that it is fairly efficient. Lighting is in even a worse plight at present. Owing to the causes referred to above, i.e., the absence of statistical records on lighting efficiencies, the apparent conflict of good lighting with cost of working—it is only reflected at present in lower costs of candle and carbide—we have no evidence on record of the evils of our neglect of this matter. Indirectly, however, there is abundant evidence on the subject, and this of such a nature as to make the need of investigation a matter of urgency.

It would be very interesting to know, for instance, which mines are most and least economical in the consumption of candles and carbide. Coupled with this should be appended tables showing their relative accident records. Of course, one would necessarily allow for circumstances which would operate in favor of or against any such mine—such as age of mine, its general layout, the amount of electric light installed, and such like.

One fact, however, stands out unchallenged, and that is the supreme importance of adequate lighting as a necessity for efficiency.

How many daily cases of minor injuries are treated in the mine hospitals, entailing a smalll expenditure in materials and possibly in time lost by the native labourer or possibly the white man. This time lost is a real addition to working costs, since the person injured does no more work for the shift in most cases, and there is always the disruption of the routine work, if only for a few minutes, but which in the aggregate is a factor in the actual working cost of the mine. The native with his candle, or sometimes a half candle, is apt to overlook the element of danger due to his being unable to see clearly his surroundings. In the hammer gang he may have shattered and loosened rock above his head hidden from him in the darkness, his time is occupied with his task, the rock falls and he is injured more or less severely. The lashing boy cannot see clearly many yards around him, he himself is only a dim shadow to others. Without being in the least blameworthy, he may quite easily cause injury to himself or others through his being unable to see clearly the surrounding objects.

The tramming boy is very often the cause of injury to himself or others for the same reason. Coming along in the dark or with his candle throwing out a feeble beam, he is unable to see clearly what lies ahead of him. Usually he is lucky and pulls through, sometimes he is not; and then the resulting accident may incapacitate himself or others for a time. All these are routine cases which are considered inseparable from and incidental to mine work, and call for no comment from anyone, but are taken as a matter of course.

Inadequate light is further responsible for the fact of much time and labour being wasted in many directions owing to the need of concentrating several lamps or candles on an important piece of work, or perhaps because it is dangerous and light is essential to show a quick means of escape if needed. It is surely high time that special efforts were made to supply a better illuminant than the ordinary candle or carbide lamp. For one thing the extension of the arrangements already in force for lighting shaft bottoms, engine chambers, pump houses, and such like, should be extended very considerably. In some of the newer mines long stretches of main haulages are lighted, with manifest advantages to efficient working and comfort in travelling. What is wanted is the extension of the system to the working faces generally.

The cost need not be excessive in the first instance, and that is at any rate partly balanced by the saving in candles and carbide possible.

Cables could be run along the drives with coupling arrangements at convenient points from whence small cables coiled on drums to be worked by hand and with attachments on the cables at suitable intervals for lamps would radiate. These cables would be unwound at the commencement of the shift and be carried up through the stone face and connected where necessary. The lamps, suitably protected, would be attached, and in this way a flood of light could be obtained which would undoubtedly make for safety, comfort and efficiency of those workers concerned. If such a method were in operation there would certainly be a far better chance of detecting bad ground in the stopes and of minimising the risk of accidents due to the condition of semi-darkness of the workers. The working face could be examined more closely, likewise the hanging wall and the general state of the stope. If the miner were further furnished with an electric torch of suitable pattern, he would then be able to supplement the general examination of the working face by a particular examination of the hanging wall and thus, so far as is humanly possible, ensure the safety of himself and his gang. The drives would have sufficient lighting power to enable tramming to be carried on under the best possible conditions and with the least fear of accidents. Similarly with regard to the lashing, timbering and waste packing gangs. One must not omit the fact of better supervising results, since the officials and supervisors would each be so much better able to see exactly what the workers were doing.

Altogether we may assert that the advantages accruing from a proper and sufficient supply of light would not only offset the actual first increased cost of installing the system, but would enormously increase the comfort of the workers, improve their efficiency, better the supervision, and reduce the accident rate very materially. The result of such a combination of improvements would necessarily be a reduction of working costs in the mine, and this would be reflected in additions to the profits of mining and in an extension of the lives of the mines of the Rand with mutual benefits to the workers, the shareholders, and the community.

(W. H. Jones in the South African Mining and Engineering Journal).

HARDINGE COMPANY NOTES.

Mr. H. A. Kimber, formerly of the Quigley Furnace Specialties Co., is now in charge of the sales of the Quigley Pulverised Fuel Department of the Hardinge Company, 120 Broadway, New York, N.Y. This change was made owing to the acquirement by the Hardinge Company of the Pulverized Fuel Department of the Quigley Furnace Specialties Co.

Mr. L. W. Marso, who is in charge of the Branch office of the Quigley Furnace Specialties Co., located at 427 Oliver Building, Pittsburgh, Pa., has now become associated with the Hardinge Company, and will continue in the Pittsburgh office under the name of the Hardinge Company, but will specialize in the handling of the Quigley Pulverized Fuel Systems, which department has been acquired by the Hardinge Company from the Quigley Furnace Specialties Co.

Mr. O. M. Rau, formerly Consulting Engineer to the Philadelphia Rapid Transit Co., has now become associated with the Hardinge Company, and will specialize in the handling of Quigley Pulverized Fuel Systems as applied to boilers. This change took place with the acquirement by the Hardinge Company of the Quigley Pulverized Fuel Department of the Quigley Furnace Specialties Co.

Mr. W. O. Renkin has become associated with the Hardinge Company, in the capacity of Managing Engineer of the Quigley Pulverized Fuel Department, since this Department of the Quigley Furnace Specialties Co. has been acquired by the Hardinge Company.

PROPOSED CHANGES IN B.C. MINING LAW.

Present indications are that there will not be any legislation of great importance in its relation to the mining industry before the Session of the Provincial Legislature now in progress. There is a possibility that in the general adjustment of taxation, a problem with which the legislators are to be faced very shortly, some action will be taken with regard to mining. Even this, however, is but speculation and will come only if the Mine Operators are able to impress the Government with the necessity of relieving them of some of the burden which, they claim, threatens to seriously hamper development.

Both the Mineral Act and the Placer Act are to be opened, but only for amendments of minor interest The purpose in connection with these Statutes apparently is to make provision for the re-alignment of the boundaries of some of the Mining Divisions of the Province. Section 112 of the Mineral Act is to be made so as to read as to give the Lieut-Governor-in-Council power "to constitute any part of the Province a mining division and declare by what local name it shall be known, and may establish therein a Mining Recorder's Office, and may from time to time extend, reduce, sub-divide, or annul any existing mining division or merge it in whole or in part in the consolidation of two or more mining divisions." No doubt has existed of the power to create new divisions, but this will give authority specifically to annul present divisions and to merge annulled divisions with others. Section 114 sets out the procedure that shall be followed with reference to records and documents in the charge of officials of a division when it annulled or merged. The Placer Act is to be altered in the same manner, the idea clearly being to make the law apply similarly both in respect of placer and lode mining, where it was deemed expedient to alter existing mining divisions.

The Toronto branch of the Association of Women of the Mining Industry of Canada will meet at Mrs. J. B. Tyrrell's residence on Wednesday Nov. 16. Mrs. E. V. Neelands will give an address on "South America."

A list of metal mines in Canada has been published by the Mines Branch, Department of Mines, Ottawa.

The Salmon River Area, B.C. and an area east of Lake Nipigon, Ont., have been geologically mapped by the Department of Mines, Ottawa. These maps are now ready for distribution.

The International Nickel Co. of Canada Ltd.

An Outstanding Concern Which, With its Mining Smelting and Refining Division, Supplies, Among Other Products Nickel, a Metal of Which Canada Possesses Almost a Monopoly.

By A. R. R. JONES.

The International Nickel Company of Canada, Ltd., supplies, among other products a refined metal—nickel—of which Canada possesses almost a monopoly. It has three main divisions. There is its mining and smelting division; its refining division, and its sales department. The last-named is situated in Toronto, in the Harbor Commission Building, where the head offices of the Company are also located. In fact, the Company occupies the whole of the fourth floor of that large building, and exceptionally handsome and spacious its offices are. The present method of distribution by the Company is, at present, entirely through this sales department. It handles nickel and nickel products, including Monel Metal, in the forms of sheets and rods and shot and nickel salts.

The officers of the International Nickel Company of Canada, Ltd., are as follows: Mr. Arthur D. Miles, president; Mr. John Agnew, vice-president and general manager; Mr. George E. Silvester, assistant to the president; Mr. Britton Osler, secretary; Mr. F. P. Bernhard, auditor; Mr. C. A. Richardson, sales manager; Mr. J. C. Nicholls, general superintendent at Copper Cliff; and Mr. John More, general manager at Port Colborne. When the Company is operating at its full strength, the employees in the mining and smelting division at Copper Cliff number around 3,500 and those in the refinery at Port Colborne about 750.

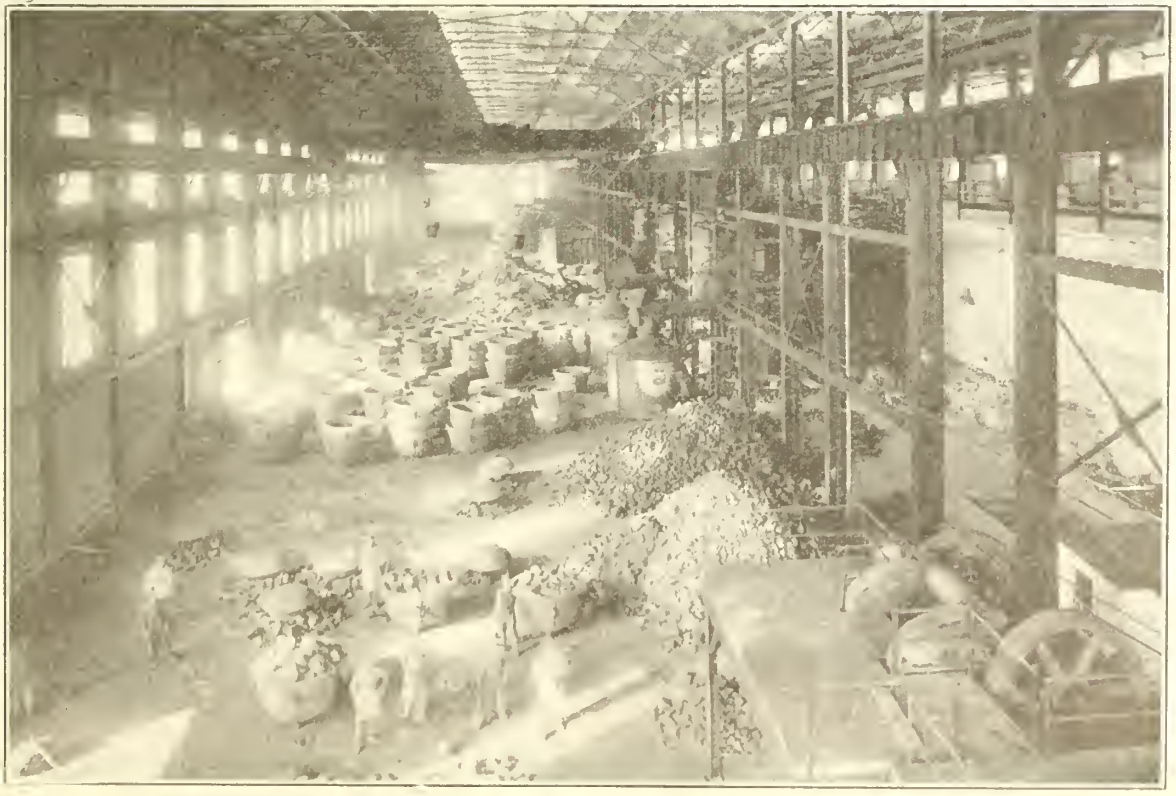
Monel Metal and Its Uses.

The outlook for the nickel business at present depends, perforce, very largely on the resumption of activity in the steel industry. It is, of course, common knowledge that, for nearly a year now, the steel industry in this country has been in a very listless condition. Largely this depression is attributable to the fact that transportation charges are nearly double, fuel costs more than double, and building trades labor costs double the charges under those respective heads before the war. Happily, there are some indications that the steel industry is about to brisk up.

Nickel steel is much used in automobile construction and also in marine machinery on account of the large reduction of weight in which its use results, as compared with the use of steel.

But one feature in connection with the Company's business, which makes for brighter prospects at the moment, is the business that it does in Monel Metal. For this is not used in conjunction with steel but by itself. It constitutes, in fact, one of the most important uses of nickel. There are very many ways in which it can be used to great advantage. For one thing, it can, in many cases, replace steel and bronzes. Indeed, it compares favorably in price with the higher grades of bronzes, and, though its cost may be higher than that of some grades, yet it possesses certain properties, such as that of non-corrodibility, that they lack.

Among the many uses to which Monel Metal is put may be mentioned the following; for parts of power plants; of gas and oil engines; of mining equipment; of dairy equipment; for storage battery casings; for meat slicing machines; for golf club heads; for parts of submarine torpedo and ordnance; for valve stems for high-pressure fire service; for general equipment, such



Cupola Furnace Building at the Refinery at Port Colborne, Ont.

as that of packing houses, which comes in contact with salt and brine; for refrigerating machinery and refrigerators; for laundry machine parts; and so forth. In fact its various uses are almost endless, and these the Company is steadily developing.

Early Days of Smelting Nickel.

The Company's mining and smelting division is, as has been stated above, at Copper Cliff in the Sudbury district of Ontario. In fact, until the advent of the Monel Company, which, in 1901, began to produce nickel in 1901, the Canadian Copper Company, which is the predecessor in title (so to speak) of the International Nickel Company of Canada, Ltd., and which is now amalgamated with the latter concern, was (with the exception of a few sporadic operations) the sole smelter of ores in the Sudbury district.

Thus the history of the nickel industry in Canada dates from the incorporation, in January 1886, of the Canadian Copper Company, now The International Nickel Company of Canada, Limited, by S. J. Ritchie of Akron, Ohio, and some business associates from Cleveland, Ohio. The original holdings were acquired by Mr. Ritchie in 1885 from prospectors who had been prompted in their search by exposure of ore in a rock cut at Murray Mine near Sudbury during the construction of the Canadian Pacific Railway then recently completed through that district. The early discoveries were taken up for copper only, the presence of nickel not being suspected, hence the inappropriate name—

The Company's Smelter at Copper Cliff, Ont.

"The Canadian Copper Company." In 1888, after a good deal of preliminary investigation, a smelting plant with one small blast furnace was designed and built at Copper Cliff by Dr. E. D. Peters who had been engaged as Manager. Dr. Peters had stated that a furnace to smelt 100 tons per day would be "enormous and unprecedented," and when asked later if he thought the smelter could be enlarged to treat 300 to 500 tons per day, said it might be done, but such large figures were very bewildering, as no plant in America was treating so much. It required comparatively little nickel at that time to swamp the entire world's markets, consumption being only about 1000 tons annually, and it was only with the development of nickel-steel and its adoption for armour plate by the United States Navy that The Canadian Copper Company began to get on its feet.

The Canadian Copper Company's operations continued to grow in spite of difficulties and disappointments, financial, metallurgical, mechanical and economic. The original (East) Smelter was enlarged from time to time until there were six furnaces, and further expansion on the original site was practically impossible. Then in 1899 the West Smelter was built. This was an up-to-date plant with eight furnaces, but still using the same type of small Herreshoff water-jackets, hand-fed and with hand-pushed matte buggies. Most of the slag had been granulated since 1891.

The Period of Rapid Development.

In the fall of 1891 a Bessemer Converter plant was built, and in 1900; the Ontario Smelting Works at Copper Cliff was put up by the Oxford Copper Company. Various mines were, from time to time, operated, and, in 1901, the construction of what is now known as the Algoma Eastern Railway, from Sudbury to Gertrude Mine, provided an opportunity to develop Creighton Mine, which soon proved to be a very extensive orebody. Then, in 1902, the International Nickel Company of Canada was formed. This combined, with certain other interests, the Canadian Copper Company, operating mines and smelter, and the just mentioned Oxford Company, operating the refinery, but the former Company, as indicated above, retained its name and identity until its amalgamation with the International Nickel Company of Canada, Ltd., in 1918. At this point, a period of rapid development, made possible by an ample supply of capital began.

The first step was the construction of a modern smelting plant on a new site, employing large units with everything possible operated mechanically. The Ontario Smelting Works was superseded by a Bessemer Converter plant adjoining the blast furnaces, using the latest type of acid copper throughout, for example, the use of alternating current for the operation of cranes and converters. This plant was blown in on July 20th, 1904. The first installation consisted of two blast furnaces 50" x 204", and three acid converter stands.

Creighton Mine.

Steam power was used at the smelter until the construction of the High Falls Hydro-Electric Plant, which was put into service in February, 1905, a thirty-mile transmission line having been completed to Copper Cliff, with branches to Creighton Mine and the newly opened Crean Hill Mine. Since that time everything at mines and smelter has been operated electrically, except railway transportation.

The present smelter since it began operations in 1904, has experienced a practically continuous programme of expansion and evolution to provide for increased production requirements and changes and improvements in smelting practice. The two blast furnaces have increased to eight, five of these being of the original length, one a quarter longer, and two a half longer.

The three acid converter stands became ten and then were shortly afterwards replaced by large basic converters of modified Peirce-Smith type, 37 ft. x 10 ft. The first of these was blown in in March, 1911. There are now six in service.

To take care of flue dust and excess ore fines a Reverberatory Plant was built in 1911 with two furnaces, 19 ft. x 112 ft., using pulverized coal for fuel. This was the first reverberatory installation of this kind, and has since been widely copied in copper practice.

The reverberatory plant includes four Wedge me-

chanical roasting furnaces with ball-mills for fine grinding.

The Roast Yards, which at one time formed three angles of a triangle surrounding Copper Cliff, much to the discomfort of the inhabitants, but which later were confined to one location about a mile from the town, and finally moved, in 1916, to a new site about nine miles west of Copper Cliff.

The Refinery at Port Colborne.

The refinery, as has been stated, is at Port Colborne, Ont., on the shore of Lake Erie, about twenty miles west of Buffalo. The site consists of 330 acres and has a frontage of about half a mile on Lake Erie. In all, there are thirty-one buildings of steel and brick construction. The design of the works provided for a complete power plant, a water-supply system, a separate sewerage scheme for storm water and sundry drainage, an electric-conduit distribution system for power and lighting and piping system for steam, oil and compressed air. The various units of the plant are served by both standard gauge and narrow-gauge railroad tracks. Railroad facilities are provided by the Grand Trunk Railway. Special attention has been paid to light, heating and ventilation, and the mechanical handling of material has been brought to a pitch of perfection. The plant was built at a cost of over $5,000,000.

The Company's Refinery at Port Colborne, Ont.

There is a hospital in a detached building. A staff house is provided for the employees, and a club-house for the accommodation of the unmarried men and executive heads. The club-house is admirably equipped for both residence and recreation, and the houses built by the Company are exceedingly attractive.

The Largest Process Building.

The largest process building is 76 feet long and 125 feet wide, and contains most of the heavy machinery and metallurgical equipment, among which are three cupolas, three reverbatory furnaces, two slag furnaces and three converters. Here the matte, received from the smelter at Copper Cliff, undergoes preliminary treatment. This matte, which consists of 55 per cent. nickel and 24 per cent. copper, is smelted with salt, cake, the nickel separated and the copper bessemerized in 84 by 126 inch Allis-Chalmers converters. One fifty-ton, one thirty-five ton, two twenty-ton and two five ton cranes are installed in this building, all of them having been built by the Dominion Bridge Company, Ltd., of Lachine, Que.

Among the other process buildings, are those used for the purposes of leaching and roasting. The leaching is carried out in a building 420 feet long by 90 feet wide. To facilitate the handling of the product between the leaching and roasting departments, these are connected by three overhead bridges. The building in which the roasting furnaces are installed is 380 feet long and 110 feet wide, and it has one clear span of 90 feet in which the ten mechanical and hand-calcining furnaces are installed.

The nickel-refining department is particularly admirable in arrangement and equipment. One part of this building is used for the storage of chemicals, etc., and contains a very perfect system of bins and measuring and weighing devices, for the preparation of furnace charges to go to the nickel-refining furnaces. These are located in the main portion of this building, and are of special design rendered necessary by the high temperature which exists under the operating conditions desirable.

The power plant is of the most approved power-house design. The main power-house boiler room contains for Babcock and Wilcox standard water-tube boilers, each of 4,319 square feet heating surface, set in two batteries. Two Babcock and Wilcox boilers of special design are installed for utilizing the waste heat from the reverbatory furnaces in the nickel refinery. They are built for an output of about 400 boiler-house power each, and are of the very latest design in this phase of engineering.

Turbines, generators and feed-water equipment are all the best word of perfection in their respective categories. The machine shop, so necessary an adjunct to a plant of this kind, is 200 feet long and 175 feet wide, and it also accommodates the forging equipment and a complete electrical repair shop. There are also a very complete carpenter shop and a cooperage.

At full capacity, the yearly production of the Port Colborne refinery consists of about 15,000,000 lbs. of nickel and 8,000,000 lbs. of copper.

U.S. SOFT COAL REDUCTION.

Production of soft coal in the United States, dropped back to 9,344,000 tons during the week ended November 5. In comparison with the week preceding, this was a decrease of 1,624,000 tons, or 15 per cent. Three factors entered into the decrease—the observance of All Saints Day, a reaction in demand following the settlement of the railroad controversy, and mine strikes in Indiana and elsewhere over the proposed discontinuance of the check-off. The relative importance of the three factors can hardly be determined until reports of operating time at the mines are received.

The impress of the three factors may be read in the following record of cars of coal loaded daily. Loadings on Tuesday, All Saints Day, were the lowest on any day of the week. Loadings on Monday were but 34,003 cars, compared with 38,832 on the preceding Monday, and the decrease of 4,829 cars measured the drop in orders which followed the news that the railroad strike had been averted. Yet hardly had consumers been relieved of apprehension over a stoppage of transportation when the news of strikes at the mines influenced them to place fresh orders with the producers. As a result, instead of decreasing as the week progressed, as usually happens, loadings increased steadily from Wednesday to Friday, the date on which the temporary check-off injunction was set aside.

Dr. W. F. Ferrier, who has been for some months in British Columbia, is at present in Toronto. He will return to the west shortly.

Schreiber Gold Deposits

Mr. T. L. Tanton, of the Geological Survey, says in a recent report on the Schreiber area:

The mineralized deposits in the Big Duck Lake district, Ontario, are of two distinct types which are probably genetically related. Those of type one are quartz veins, locally feldspar-bearing, and hence pegmatitic, carrying disseminated pyrite and small quantities of chalcopyrite and yielding upon assay low gold values. Native copper occurs near the surface in veins carrying chalcopyrite. Commonly there is a thin gossan, less than a foot deep at the surface of these deposits, but on one of the Longworth claims a highly pyritiferous vein has been weathered to a depth of 12 feet, and fine gold can be panned from the gossan. This is locally known as the Mud vein though it does not occur in a fault plane. These veins range from less than a foot to about 15 feet in width and their walls are fairly distinct, though a narrowed marginal zone of country rock is frequently found impregnated with quartz and pyrite. These deposits have the appearance of fissure fillings which have a minor amount or marginal replacements of country rock associated with them. Faults are very difficult to recognize in the regionally deformed schist complex and insufficient information is at hand to permit of any generalizations regarding the cause of the vein distribution, though evidence of faulting can be seen locally in connexion with certain viens. A vein on the Estelle property has been traced for 60 chains and other veins of this type apparently show a considerable degree of continuity, though much stripping would be necessary to expose this feature. The veins trend in various directions.

The second type of gold deposit is in carbonate replacement bodies. Part of the carbonate is pale grey, fine-grained calcite; this locally carries finely disseminated galena, zinc blende, chalcopyrite, pyrite, molybdenite, and gold. Enclosed in this material, lenticular masses of rusty weathering dolomite, from 6 inches to 2 yards in maximum diameter, occur, within which there are plicated streaks rich in bright green chlorite, mica, and serpentine. Barren quartz veinlets cut the assemblage. The shape and size of the carbonate bodies are irregular and variable in different localities. Lenticular masses having approximate diameters of 10 feet and 100 feet occur; and on the McCuaig property, where ore has been found, the carbonate body has been traced for 4 chains with widths varying from 3 feet to a few inches. The known carbonate bodies occur in a zone trending north 60 degrees east from the northern part of Little Duck lake to near the northwest part of Big Duck lake. In general these bodies have their longer dimensions parallel to the foliation of the sheared rocks and occur in sheared quartz porphyry, andesite, and along the contact between these rocks.

Near the top of a hill on Estelle claim, T.B. 1911, a mineralized quartz vein and a marginal calcite replacement body are exposed. The intimate relationship of the two typical deposits here indicates a close genetic relationship.

The origin of the gold-bearing solutions is not known. The igneous rock which appears to be most closely related to the gold deposits in time and place is the massive, pale pink, quartz porhyry. This rock is thought to be younger than the sheared, grey, quartz porphyry in which some of the replacement bodies lie.

Assays of gold to the value of over $1,000 to the ton are reported to have been obtained by Mr. W. S. Jackson from his claim, R 425, about 2 miles east of Schreiber. The mineralized veins in common with others developed farther east occur in the schist complex very close to the contact of the intrusive granitic batholith. The mineralized veins carry very little visible gold and average about one foot in width; they are well defined and occur as a nearly parallel series with certain additional cross veins. The extent of the high-grade ore in the deposits has not been determined.

No copper deposits of economic value are known in the district though copper minerals occur in deposits of at least three types: (1) chalcopyrite disseminated through quartz veins cutting the schist complex, the best known examples being on claims T.B. 2091 and T.B. 1911 and eastern extensions, in the Big Duck Lake district; (2) native copper in amygdules and veinlets in the Keweenawan lavas on the outer islands; and (3) chalcopyrite associated with lead and zinc minerals in quartz calcite veins cementing fissures and fault planes which formed in Keweenawan or post-Keweenawan time.

A great series of veins carrying copper, lead, zinc, and silver minerals, is now known to occur in a zone bordering the shore of lake Superior as far west as Pigeon river. In the opinion of the writer systematic prospecting should be carried on in the exposed veins of this type and an effort should be made, where feasible, to expose veins in fault zones of late Keweenawan age. In the writer's summary report of 1919 special mention was made of veins of this type and it was pointed out that new discoveries of silver ores may possibly be found analogous to those at Silver islet and along the north shore of Thunder bay. The mineral assemblage in veins of this type is remarkably similar over a large area, though the proportions of the constituents vary considerably even within short distances; the principal minerals are: galena, zinc blende, chalcopyrite, pyrite, and occasionally silver and argentite, together with quartz, amethyst, calcite, fluorite, and barite.

A number of mining claims have been staked with the apparent purpose of taking up for development veins of this type, but no work was in progress at the time of the writer's visit and no deposits of commercial value were seen. It is reported that a small amount of native silver was found near the surface in a vein on claim R 570, 1½ miles north of Pays Plat village; the occurrence of silver has been reported from two other localities to residents of the district, but from the available data on the location of these deposits the reports could not be verified. A trace of silver was found in the analysis of a sample from a narrow galena-bearing vein on lot 9, con. IV, Nipigon tp. Samples from several of the veins elsewhere in the district show no silver content upon assay. The greater part of the silver found in neighbouring areas has occured as recognizable silver ore; not carried by the galena or other minerals in the veins.

Mr. R. R. Rose is at Galetta, Ontario.

Mr. J. B. Tyrrell has been visiting gold properties in the Cariboo district, British Columbia.

Mr. C. J. F. Galloway is returning to England from Sarawak, Borneo.

HUDSON BAY REPORT.

The annual report of The Hudson Bay Mines, Limited, for the year ending August 31st, 1921, is now being sent to shareholders. The drop in silver's price hit the company hard and wiped out of its calculations the possibility of treatment of much low grade ore and old tailings. The investment in Dome Lake, the weak sister, and the loss on last year's operations, have made a big hole in Hudson Bay's liquid assets. During the year it was necessary to issue $35,000 in bonds.

The directors report in part as follows:

"Underground work at your Cobalt mine was carried on continuously from September 1st to April 11th, 1921, when it was deemed wise to stop further mining operations as no new discoveries of high grade had been made and the ore in sight was of too low grade to pay unless a marked increase took place in the price of silver. Mill operations were stopped on October 14th, 1920, in accordance with the recommendations of your Manager in last year's report. Costs in the winter months are considerably higher and it was necessary to allow time for underground development to place a supply of broken ore ahead for milling. The development and exploration work carried on throughout the winter did not develop anything of importance, but produced 6,000 tons of mill ore broken or blocked ready to break. It was decided to start the mill in August, 1921, in order to treat this ore before cold weather should render it more difficult and costly and the mill was started again on August 22nd, last. Reserves of broken and blocked out ore are estimated at 4,896 tons, containing 48,960 ounces. No estimate is made of ore in the dumps, tailings or probable ore left in the mine.

"The financial statement shows a total revenue of $17,418.40, and a total expenditure of $37,765.50. Against the balance of $20,347.10 carried to Loss and Gain account must be placed the value of 4,896 tons of ore developed.

"The amount necessarily expended in exploration of your property last winter was raised by a bond issue of $35,000, approved by the shareholders at a special general meeting called for that purpose on the 18th day of December, 1920.

"The Dome Lake Mining & Milling Company was idle throughout the year. Negotiations are at present being carried on by that Company with the adjoining West Dome company with a view to a possible amalgamation of the two properties and in the event of this consolidation being completed the properties would again be actively developed. Such an arrangement would facilitate the economic working of important ore bodies.

"The Kirkland-Hudson Bay Gold Mines was also inactive in the past year, but other neighboring developments in the camp have served to enhance the value of its properties in the opinion of your directors.

"No work was done on the company's properties at Gowganda or its other claims in the Kirkland Lake area.

"The directors hope that the coming year will be a successful one. It would appear that the ore in sight in your Cobalt property is of such low grade that without higher silver prices or lower costs with improved methods of treatment the working of this lower grade material will not be profitable. The directors consider the company's holdings in other fields to be very valuable and trust that future developments will lead to renewed prosperity for the company."

The Loss and Gain account shows a balance at credit of $96,591.31 after deducting the loss on last year's operations.

Current liabilities, including the bond issue of $35,000 and accrued interest, total $43,000.

Included in the assets of the company are bills receivable of $19,000, accounts receivable of $4,877.21 and ore at smelters and bagged at mine $2,660.30.

Outside such assets as mine and mill plant and buildings, and mining claims in Gowganda and Kirkland Lake are the following investments in other companies: Dome Lake bonds and accrued interest, $34,112.50; Dome Lake stock, $318,909.57; Kirkland-Hudson Bay Mines stock, $44,000.

The manager states in his report that the results of exploration and sampling carried on in the past year on the Cobalt property do not warrant further large expenditures in development unless a marked advance in the price of silver occurs. The present broken and developed ore, he says, can be milled at a profit, but under present conditions he would not recommend further work after it is used up.

BRITISH COLUMBIA NOTES.

Stewart, B.C.: All the towers in connection with aerial tramways of the Premier Mining Company have been completed and most of the work at the upper end has been done. At present operations are being pressed forward on the bunkers at the dock. Additional and better storage and shipping facilities are to be provided at tidewater. The construction of a train up the north fork of the Marmot River has been of much assistance to prospectors and claim holders in that district. The owners of the Idaho Group expect to ship some 20 tons before the Spring. They say that they have been driving along a shoot of high grade galena, carrying high values in silver. This has increased from a few inches to 18 inches in width and they expect to realize a good profit notwithstanding high transportation costs.

Trail, B. C.—Receipts of ore at the Trail Smelter of the Consolidated Mining & Smelting Co. from the 15th to the 21st of October totalled 7,964 tons, all of which came from the Company's mines. For the last ten days of October there were received 10,963 tons, or over 1,000 a day. Four well-known mines appear on the shipping list for the first time this year. The Rambler-Cariboo, which W. A. Cameron and associates are working under lease, is credited with 30 tons; the Utica, now operating after a long period of idleness, with 47 tons; the Silver Bell, Kaslo Creek, with 46 tons; and the Silver Standard, of New Hazelton, with 30 tons. Other contributing properties were the Josie, Rossland, 92 tons; Rosebery-Surprise, New Denver, 182 tons; and the Knob Hill, Republic, 217 tons. Company properties shipped 10,319 tons. The aggregate total of ore treated at the smelter up to the end of October approximates 337,201 tons.

Greenwood, B.C.—The stamp and mining machinery of the Lemon Mine, near Camp McKinney, have been shipped to the Emancipation Mine, near Hope.—It is reported that the Federal Group of Mineral Claims, situated a short distance north of the old Stemwinder Mine, is to be explored by diamond drill. An outfit in charge of Mr. Dan Lynch is on the ground prepared to start operations.

Vocational Training of Industrial Cripples

(The following paper, presented at the Annual Meeting of the Mining Society of Nova Scotia at Halifax, by Principal F. H. Sexton, of the Nova Scotia Technical College, and published in the Bulletin of the Canadian Institute of Mining and Metallurgy, should be of interest to the readers of the Canadian Mining Journal.—Ed. C. M. J.)

When our young men went overseas in the recent war to fight for their country, their parents, relatives, and friends were fearful that they would be killed or come back helpless and totally disabled. The last few hours before embarkation of the fighting units were always periods of terrific mental stress for mothers, wives, and sweethearts of the soldiers. There were strained faces, anxious hearts, and loving eyes, but no tears until the boys were well away out of sight. Were not these strong lusty youths going to pit the mere strength of their young bodies against the most terrible engines of destruction the fertile brains of man had been able to produce? With guns that could accurately place, within a radius of 15 miles, shells weighing a ton each and making a crater 150 feet across and 40 feet deep; with machine guns that spit a stream of bullets at the rate of 300 a minute; with poison gas so deadly that it needed only a few breaths to burn out a human life; wih darts and bullets and bombs from giant aeroplanes above, and high explosive placed by the ton beneath; with rifles, rifle grenades, hand bombs, trench mortars, flame throwers, high explosive and shrapnel shells, barbed wire entanglements, saw-tooth bayonets; with death lurking at the elbow in a thousand hideous forms every minute of the day and night—how could those at home expect aught but that their loved ones would be obliterated, or would return mangled, hopeless wrecks.

But what were the facts? Man's ingenuity developed cunning devices for his own protection against every form of danger. These artifices are now well known and are so effective that, on the basis of the number of men engaged, this war was practically no more deadly than those which had been fought previously under more primitive conditions. The percentage who were disabled by dread disease was even less than in some other notable struggles of nations. The number of those who were maimed by wounds was also kept down to the proportion prevailing in other wars, through the recent discoveries and advancements in medical and surgical science and practice.

The ordinary mother or wife does not usually hang trembling on the neck of the husband or son when he goes forth to his daily work unless she be inordinately fearful and he engaged in some extremely hazardous occupation, such as an oilwell shooter or a caisson worker. In the ordinary duties of life, however, an unrecognized amount of danger always lurks. During the four years of warfare, our army recorded about 55,000 deaths and 250,000 casualties. Among the people in peaceful pursuits here at home, where it seems as though everything possible has been done to protect human life, in that same period there were about 20,000 people killed and 250,000 injured by accidents. The numbers are truly appalling. It is only thirty times as dangerous to march against a foe under the terrific conditions of modern warfare as it is to pursue the peaceful art of ordinary living. One out of 1,200 of the people in this Province is killed by accident each year, and one out of every 110 is injured. And these are the figures of terrible waste which do not take into account such terrible catastrophes as the Halifax Explosion, which was probably a preventable accident due to criminal carelessness.

Preventable Fatalities.

The ordinary person has a vague notion that most of the deaths and injuries are caused by the swift machines controlled by men in organized industry, but this is not the case. Only a little over one-third of the accidents are associated with industry according to the records of the Workmen's Compensation Board. One-fifth of the accidental deaths occur among children under the age of fourteen.

These are figures that cause the most callous and selfish among us to pause and ponder. When we realize that three-quarters of the deaths and serious injuries in industry, and probably a greater proportion of the others are preventable, we do not wonder at the increasing activities of Safety Societies, Accident Prevention Associations, and other organizations of like nature. We will not blame the mother, either, if she clings longingly and affectionately to her husband when he starts out in the dim light of morning with his dinner pail, or if she seems to unduly prolong the caresses on her curly-headed boy before he trudges away from home with his school books. The definite organizations for the prevention of death and injury by accident began only twenty-five years ago, but they have already done an enormous amount of good in industry. The great need now is to extend them to include every human being who is old enough to talk.

The special stress of this paper will be laid upon one aspect of accidental injuries. If a man is killed, there is nothing to be done but to pay respect to his worth through a decent funeral and to provide some means of pensioning his dependents so that the family may be held together until the children are prepared to take their places as wage-earners. For every death by accident there are approximately thirteen injuries from like causes. One-half of these result in such disability that the worker is maimed for life or loses over a month of time from work. It may be said conservatively, that in Nova Scotia there are 750 people accidentally injured every year and are left crippled in such a way that they cannot return to their occupations and discharge their duties efficiently. Many of these lose heart and are permanently submerged in the daily struggle for existence by depending on intermittent charity or on a non-productive job as a watchman, gate tender, elevator-runner, etc.

What should be done with these men and women who are so maimed by accidents that they cannot go back to the occupation in which they were earning their living before their misfortune? Happily the answer is not far to seek. It comes out of the experience of this country in the civil re-establishment of its crippled soldiers.

The Analogy of War.

When our broken soldiers began to drift back from the second battle of Ypres through the English hospitals to convalescent homes in Canada, our whole country

feverishly tried to show her gratitude to these boy-heroes, who had so ably held our lines against the pick of the German army, attacking with the aid of a deadly new contrivance—poison gas. Of course, pensions were provided, because such reparation had been established in previous wars. This, however, did not seem wholly adequate. The facts that Crimean veterans had died in the English workhouses and that Canadians demobilized from the Boer war had sold their land-grant scrip for a few dollars hung tenaciously in all minds. In the present conflict, any reward that the country could afford and that would be a real benefit to the disabled soldier was considered as due him.

This attitude on the part of the public led to two great efforts to restore the crippled man as far as possible to his normal state of mind and physical efficiency. The first work attempted to bring back the man's confidence in himself and to re-establish habits of industry. No one who has gone through an experience which includes a serious surgical operation or long hospital treatment and a definite loss of physical power can at all appreciate the depths of despair to which the patient sinks in the long hours and days of convalescence. No one else can sympathize with the sloth of the mind and the timidity in facing actual life again which are acquired wth long 'hospitalization.' The ordinary and even the exceptional hospitals are institutions where physical ailments are treated only until the patient is fit to be transported to his own household. Nothing is done in connection with the person except to make the body repairs and to carry him along until he can complete the convalescence with his own family. Imagine, if you can, the perpetual horror of the ordinary, strong, independent mechanic when he recovers from a serious accident and is sent back among his dependents to look into the future with the idea that he will be unable to carry them along further, and may even be a drag on their efforts to support themselves.

With the disabled soldier, provisions were made from the start to restore him physically and mentally. Medical skill of the highest order used its every resource to bring him as far back to normal as was possible. Just as soon, however, as he was capable of receiving it, other agents began to build up his confidence in his power to still win success in the world in spite of his handicap. He was prevented from becoming morbid through long days and nights of gloomy introspection and dismal foreboding. He was given light, interesting work in various kinds of handicrafts while he still lay in bed. Through this activity, his mind was kept from brooding on himself, he renewed his interest in life, his self-confidence began to return, his creative instinct was satisfied, his mind maintained an objective altitude through work, and convalesced more rapidly than he would have otherwise. As soon as he could hobble about, various classes were provided for him in an annex to the hospital, where sympathetic, competent teachers helped him repair defects in his general education or started him in some kind of vocational instruction, leading to some occupation where his disability would be little or no handicap. The hospital retained him under its direction and care until no further treatment would benefit him. When he emerged from the hospital, he was an upstanding man, hopeful of the future and confident that he could fill some useful occupation and still maintain his position as an independent, self-respecting citizen.

He usually was not ready at once to enter commercial or industrial work as a man who could command a living wage and here functioned the second division of the work intended to make him capable of re-establishing himself. This was a new branch of humanitarian activity which came to be known as 'Industrial Re-training'.

If the soldier had been discharged finally from hospital treatment with a disability incurred through wounds or disease in military service, or an old disability aggravated by service, so that he could not return to his old occupation and perform his duties efficiently, he was entitled to be trained for a new occupation which he could follow with success. The method was to give him a short period of intensive vocational education so that he could take his place in industry where his handicap would not interfere with his ability to make a living. This education might be given in a special school, or partly in a school and partly in an industry, or wholly in an industry. Each case was treated in a different way and the individual needs satisfied as fully as possible by special consideration. Of course, the man and his dependents had to be maintained while this training was going on. They received enough money while he was learning so that they could live respectably. The amounts were graded according to the number of the man's dependants, and were varied from time to time according to the cost of living. During training the mind of the man and his family were relieved of anxiety so that he could put forth his full effort to learn the new trade.

The results of this method of preparing the disabled man to re-establish himself as a normal worker were surprising and gratifying. The efforts put forth by the disabled man were heroic in many cases. He struggled to adapt his remaining powers to the task before him. Nature seemed to help those who had suffered a physical loss by stimulating the remaining powers to a new degree of acuteness. It had been feared that the task of educating mature men would be more difficult than would have been the case with plastic youths, but this was not true. Under the pressure of necessity to make good for his own sake, and often for the sake of two to even six or eight dependents, the discharged soldier progressed amazingly. He had had some years of industrial experience before he enlisted and thus had a foundation on which to build. He was kept as close as possible to his former occupation so that the re-adjustment would be less difficult. If the man had the mental and personal capacity, he was trained for a job requiring more use of his intelligence and consequently less physical effort. Industry as organized at present offers a great many positions low in the scale on the staff of administration, direction, or control, and is continuously looking for suitable men to promote. Many of the disabled soldiers were lacking in general education for one reason or another, so that with these defects corrected and some technical training added they were able to be promoted to a higher rating than they had before they lost part of their physical power.

Comparatively Easy Task.

Modern industry has become so highly specialized and sub divided into occupations that it is a much easier task to select and prepare a disabled man for a new vocation than it would have been twenty years ago. Where formerly a boy learned a whole trade by apprenticeship for four to seven years with a master

workman, now a youth becomes proficient as an operator in one of the sub-divisions of the trade in a few months to a year, and earns a much higher wage than used to be paid to the thorough mechanic. Physical toil has been eliminated to a large extent by labor-saving machines so that there are infinitely better opportunities for a man with a physical disability to fit himself to work successfully at a gainful occupation.

All are more or less familiar with the splendid work that has been carried out in the industrial re-training of our crippled soldiers. Each man was carefully interviewed and all the facts ascertained about his education, his industrial history, his aptitudes, and his own wishes regarding a new trade. Our men were sensible and shrewd enough, so that generally they had formulated a sensible plan for their re-establishment. In many cases, however, they had formed wrong conceptions about certain occupations with which they were only casually acquainted. To them, as to most people, the "distant fields were ever green." As might be expected, a goodly number were looking for some "soft snap with easy money." They were patiently and wisely counselled by men who had a wide practical knowledge of various trades and who were thoroughly familiar with the physical and mental requirements of workers, and the prevailing rates of compensation in these various trades. As far as possible the injured men were kept in their old industry, and trained for occupations parallel with their former work, or for higher positions, if they seemed to possess the proper personal qualifications and were able to fulfill the demands.

The process of training was simple and practical. Where special educational institutions were carrying on the proper kind of intensive, efficient courses, as was the case with business colleges, the soldiers were placed in them. Some institutions like agricultural colleges, technical colleges, and art schools, patriotically organized special courses for disabled soldiers and trained them adequately in a variety of branches. Unfortunately, schools where trades were taught had not been developed to any great extent in Canada. Therefore, trade classes were specially organized on an extensive scale by the Dominion Department of Soldiers' Civil Re-Establishment. Those trades were covered which normally enrolled large numbers of workers in our industrial life, and which could absorb many new recruits without throwing the labor market out of adjustment. Among the classes conducted were those that trained men to become garage mechanics, gasoline marine engine repairers, architectural and mechanical draftsmen, electric wiremen, carpenters and cabinet makers, boot and shoe repairers, machine tool operators, oxy-acetylene cutters and welders, barbers, stationary engineers, masters and mates in the merchant marine, wireless and commercial telegraphers, various certificated workers in the collieries, etc. Temporary quarters were secured and fitted up with adequate equipment. Instructors were secured who had demonstrated in practical life that they were thoroughly competent in their respective vocations. New intensive courses were planned and the work done in the classes was as far as possible conducted on a commercial basis. The reason for all operations was carefully explained and each man was given individual attention. The men were not thrown from the school into actual industry to sink or swim without a period of adjustment to actual working conditions. The students were thoroughly instructed for a period of four to six months and then apprenticed in industry itself for another two to four months. All this time the man was receiving from seventy-five to a hundred and fifty dollars per month (according to the number of his dependents) besides free tuition, books, etc.

The results were astonishing. These injured men bent themselves heroically to the task, and the instructors plied them with information. They marched forth from the classes for short apprenticeships into industries large and small throughout the Province, and were usually absorbed on the pay rolls when their courses were completed. Employers gave them every chance and their brother workmen in trade unions waived their regular rules and assisted them to their utmost. In cases where there were small groups entering widely diversified occupations, and where the trade could be learned better in the industry itself, the men were apprenticed directly in workshops for the whole eight months of training.

Over 30,000 disabled soldiers successfully completed their industrial re-training courses, and of these about four-fifths were, up to the recent industrial depression, holding their places satisfactorily. This covers men occupying positions in nearly three hundred different occupations.

Same Problems Here.

I have dwelt on the methods employed and the results obtained in the re-training of disabled soldiers, because the problems of re-establishing workers who have been seriously injured in industry is precisely the same. The handicap of losing an eye, or a hand, or a leg, is practically the same to a wage-earner whether he loses it in war or in his daily work. The procedure of preparing him for further usefulness in remunerative work should be the same in both cases. The experience that has been gained in dealing with those maimed in war should be applied immediately to the great army of industrial cripples who are being recruited through grievous accidents every day. The expert organization that has been dealing with discharged soldiers is fast disintegrating because its work is nearly finished. But it should not be allowed to vanish. An adequate provision should be made to retain enough of the organization to enable it to assist in the re-establishment of the cripples.

It was a simple matter to secure sufficient funds from war appropriations to re-train disabled soldiers. You may rightly ask where money is to be secured to carry out the same education in the case of men handicapped from accidents in industry. This is partly a national concern, and some generous appropriation should be forthcoming from the Federal Treasury to assist the Provinces to meet the needs. The United States has recognized the rightfulness of such a measure, and now furnishes $1,000,000 a year to be distributed among the different States on the basis of population, in order to assist them in re-training industrial cripples. Each State must spend an equal amount from its own funds in order that it may obtain the Federal money.

A portion of the money paid by the Workmen's Compensation Board as reparation to an injured man could be made available for his re-training. The common method of award is to grant the disabled man a little more than half his pay, up to a maximum amount, for a number of weeks depending on the nature of the injury. This is supposed to provide for him until he has completely recovered and then for a further period while he is re-adjusting himself until he is ready to go back to some kind of work. In the cases of serious injuries where probably there exists usually the clearest need for re-training, the period is extensive, much longer than is necessary for recovery and re-adjustment. Very

often the man makes no attempt to take up work again until the last bit of award for compensation has been spent. During this time he has generally acquired an exaggerated estimate of his inability to successfully compete in industry with a normal worker, and he may also have formed new habits of sloth and idleness. If the Workmen's Compensation Board had the power to use its judgment in applying a portion of the award for injuries to industrial re-training, many of its wards could be entirely rehabilitated by intensive vocational education to suit each man's case so that he could be fitted for a new occupation, where he could successfully compete again in a gainful trade. It would also materially reduce his period of withdrawal from productive work. In most cases where a worker has sustained an injury through accident, his employer feels some moral obligation to find a place for him again on the pay roll. The employer would usually be only too glad to co-operate with any agency in an effort to see that the disabled man was fitted for the highest position he could fill competently, instead of having to make a place for him as an attendant, janitor, gateman, etc.

From the figures I have quoted you have seen that the number of people crippled and maimed by accidents every year is a very serious matter. During the last five years, disabled soldiers with every kind of ability, experience, and handicap have been successfully trained for 300 different occupations. The methods of industrial re-training have been completely developed and the results to the man and the nation have been highly gratifying. Are we to let the army of those who are daily crippled and maimed in the peaceful walks of life drift into the hopelessness of performing the minor tasks when they have potential productive power that can, with a little training, be saved and developed? This is a rather simple problem which calls for the co-operation of the employer with the Provincial and Dominion Governments. Our duty is evident, and the trail is clearly worn. It is a service which is absolutely justified on both economic and humanitarian grounds.

Northern Ontario Letter

THE SILVER MINES.

Increasing Silver Output.

Revised estimates of the production of silver from the mines of the Cobalt district, including South Lorrain and Gowganda, show a substantial increase in production as compared with preceding months of the current year. The increase is due to favorable results on the Nipissing as well as another big month for the Keeley. From the figures now available officially, it would appear as though the silver production reached close to 900,000 ounces as compared with about 800,000 ounces during the preceding month.

From present indications, the output throughout the winter will probably range between 800,000 and 900,000 monthly, followed by another substantial increase in the spring provided the Beaver Consolidated, Temiskaming and McKinley-Darragh are able to resume production at that time.

The price of commercial bar silver is steady at around 70 cents an ounce, added to which is a premium of about 8 p.c. on account of the exchange on New York funds where the silver is marketed. At this rate, the income to the mines amounted to about 75 cents for each ounce of silver produced, the value of a production of 900,000 ounces being approximately $675,000 for October.

The number of men employed in the silver mines has reached approximately 1,100, and this may reasonably mark about the average force until such time as some of the closed down mines decide to re-open. Wages continue to be comparatively high, the average being between $4.25 and $4.25 per eight-hour day.

Keeley Silver Mines.

The Report of the Keeley Silver Mines, Limited for October shows a production for the month of 102,819 ozs. of silver, of which 36,819 ozs. are mill concentrates and 66,000 ozs. high-grade. This makes a total production since operations of the mill commenced in June of 263,000 ozs.

The No. 16 vein, which runs at right angles to the Wood's and No. 6 vein, has been drifted on for 32 feet at the 6th level (418'). For this distance the ore is high grade, averaging 4,000 oz. per ton in silver over a width of 12 inches. The drift will be extended as soon as the No. 3 shaft, at present being deepened, reaches the 6th level. During October the No. 16 vein was opened up at the 5th level to a length of 44 feet from the Wood's vein, disclosing excellent mill rock and considerable patches of extremely high grade ore. The drift on the Wood's vein north at the 6th level is now 160 feet long, entirely in good ore, with the last 30 feet in high-grade.

Nipissing.

Production from the Nipissing mine for October underwent a big increase, the regular monthly statement of Hugh Park, manager, showing an output of well over a quarter of a million dollars.

"During the month of October", says the statement, "the company mined ore of an estimated net value of $258,768. No bullion was shipped during the month. The value of the silver production was estimated at 69½c per ounce.

Underground development work was satisfactory. Results at vein 251, the new vein in 63 shaft, were not so good during October as they were for September. An ore shoot, 60 feet long, assaying 2,500 ounces over a width of three inches was developed in September. Work during October did not greatly increase this length. Vertical development is now under way and it is expected that the ore shoot will prove to be of greater extent than at the second level. Favorable results were obtained at 64 vein. Development at an intermediate level disclosed ore having a width of as high as 26 inches and assaying 2,500 ounces to the ton. Steady production is being obtained from this vein.

The low grade mill treated 6,736 tons. The high grade plant treated 176 tons. The following is an estimate of production for the month of October:

Silver production	$243,333
Cobalt production	15,435
Total	$258,768

Coniagas.

It has been learned on good authority that the annual statement of the Coniagas Mines for the fiscal year ended October 31st, will be favorable and will show an increase of close to 20 p.c. in production. The number of ounces recovered from each ton of ore treated was the lowest on record, but a big increase in tonnage was established. The company attained a maximum of close to 700 tons daily near the close of the period. Full details are not available until such time as the report may prepared, but in view of the company having conserved its finances during the year, the balance sheet is expected to show the surplus well maintained at over $2,000,000. During the period under review, a total of 5 p.c. amounting to $200,000 was paid in dividends. This compares with 12½ per cent amounting to $500,000 dur-

be prepared, but in view of the company having conserved

dividend record of $10,240,000 to its credit and is led only by the Nipissing and the Hollinger among the precious metal mines of Canada in point of dividends paid.

The Gowganda District.

Good progress is reported on the Alpine Silver Mines in Gowganda where work is being carried on aggressively. Considerable ore has been taken out by open cuts at surface, and arrangements are now being made to extend a tunnel at a point where it will encounter the veins at a point about 200 feet below surface. The company is spending about $3,500 monthly on exploration and development work and is said to be financed to carry out its scheme of work.

Mining Disputes.

Five mining disputes will be heard by Mining Commissioner T. E. Godson, K.C., at his regular monthly sittings which will be held in Haileybury, beginning Nov. 16th.

Following is a summary:

J. D. Lavillie vs. Max Kaplan, this being a dispute in respect of mining claims L.-9001 and L.-9002 situated in the township of Gauthier, in the Larder Lake mining division.

C. Edmonds vs. Peter McLaren, a dispute in respect of mining claim L.-4661, situated in the township of Lebel in the Larder Lake mining division.

T. W. Wilson vs. John Bruce, this being a dispute in respect of mining claims L.-9469 and L.-9470, situated in the township of Gauthier in the Larder Lake mining division.

Kinch and Porcupine Porphyry Hill Gold Mines vs. Jules J. St. Paul, being an application under section 86 of the Mining Act, in respect of mining claim P.-8288 situated in the township of Deloro, in the Porcupine mining division.

Ole Olson, Albert Wickstead and O. Wickstead vs. B. G. Killoran, this being a dispute in respect of mining claims L.-6698, 6699, 6769, 8207, all situated in the township of Maisonville in the Larder Lake mining division.

THE GOLD MINES.

The question of development of additional hydro-electric energy holds a leading place in the minds of those identified with the gold mining industry of Porcupine. This subject is dealt with at more or less length in another column of this issue of the Journal.

Dome Mines.

Achievements at the Dome Mines continue favorable, and an income of approximately $8,000 has recently been established. The mine appears to have definitely found a place among the higher grade producers instead of being known as a low grade mine as in former years. Net profits are accumulating at a substantial rate above current dividend requirements of 2½ p.c. quarterly, and the disbursement of an additional 10 p.c. in the form of a capital reduction is considered a certainty before the end of the company's fiscal year, March 31st.

Paymaster.

Good progress is being made on the Premier Paymaster, formerly known as the Standard property. Good values are reported, and the promoters of the project believe they will be able to proceed with plans and specifications for a mill some time during the coming year.

Hollinger.

The Hollinger Consolidated has recently established an "average" tonnage of around 3,800 tons daily, which appears to mark the peak with present equipment. Indicated income, inclusive of premium on New York funds is approximately $40,000 daily.

Porcupine V. N. T.

Negotiations of importance are pending in connection with the Porcupine V. N. T., and the outlook for this property has brightened perceptibly. Its location immediately adjacent to the Hollinger, and the occurrence of numerous veins under somewhat similar conditions as on its big neighbor is attracting genuine interest.

Growing Interest in Gold Mines.

As the tidings of extremely favorable achievements at the producing gold mines of the Porcupine and Kirkland Lake fields gradually find their way to all parts of the world, the interest in this important Ontario industry grows steadily.

Thirty-five hundred men are now directly employed in the gold mine of these two districts, while many more are engaged in prospecting.

Seven mines are turning out bullion at an aggregate rate of over $1,500,000 every thirty days. A number of new producers are assured for the coming year and with an indicated output of $2,000,000 a month before the next year draws to a close.

The traffic to and from the mines in the form of freight and passengers goes a long way to maintain the railways which, in turn, comprise a necessary part of the entire north. Given due consideration in regard to taxation and the industry promises to experience additional important growth and thereby pave the way toward the permanent development of the whole of Northern Ontario.

McIntyre.

Arrangements in connection with driving the main shaft of the McIntyre-Porcupine to new deep levels are being carried out, and the mine will soon be operating at a lower horizon than any other precious metal mine in Canada. This work is preliminary to placing the mine in shape to feed the proposed bi-addition to the mill.

For the time being, however, the plans to double the capacity of the milling plant are held in abeyance, and no actual construction is expected to take place until spring. In the meantime, a total of about 550 tons of ore are being handled daily in the present mill and a production of approximately $175,000 monthly is being maintained.

Ontario-Kirkland.

The installation of a 100-ton mill on the Ontario-Kirkland has been almost completed and the tuning up of the equipment will commence within the next week. The mine has been extensively developed and production is expected to reach upwards of $1,000 per day before the current year draws to a close.

The addition of the Ontario-Kirkland to the producing list will increase the aggregate output of the Kirkland Lake district to approximately $6,500 every twenty-four hours.

Wright-Hargreaves.

Announcement is made by the Wright-Hargreaves Mines, Ltd., that a dividend of five per cent will be paid January 1st to stockholders of record December 17th. It is stated that this dividend is "From the accumulated surplus earnings since the 1st day of January 1921, the time of the commencement of operations of the mines."

This dividend will call for the distribution of $125,000 and is the initial bow of the Wright-Hargreaves among the dividend paying gold mines.

A feature of the dividend is that during the war and for some years thereafter, development work was conducted on a quite limited scale, up until the beginning of the current year. The construction of a mill was accomplished during 1920, and the plant was brought into operation early in May of this year. The dividend announcement, coming within six months after commencing production is an achievement difficult to equal in the gold mining industry.

The Canadian Miners' Buying Directory.

Acetylene Gas:
Canada Carbide Company, Ltd.
Prest-O-Lite Co. of Canada, Ltd.

Acetylene Welding:
The Toronto Iron Works, Ltd.

A.C. Units:
Powley & Townsley, Limited.

Agitators:
The Dorr Co.
Can. Chicago Bridge & Iron Co., Ltd.
Horton Steel Works, Limited.

Air Compressors:
Belliss & Morcom, Ltd.
Laurie & Lamb

Air Hoists:
Canadian Ingersoll-Rand Co., Ltd
Mussens, Limited.

Air Receivers:
The Toronto Iron Works, Ltd.

Alloy and Carbon Tool Steel:
Peacock Brothers Limited.

Alternators:
MacGovern & Co

Aluminium:
Spielman Agencies, Regd.

Amalgamators:
Northern Canada Supply Co.
Mine and Smelter Supply Co
Wabi Iron Works.

Antimony:
Canada Metal Co.

Antimonial Lead:
Pennsylvania Smelting Co.

Assayers' and Chemists' Supplies:
Dominion Engineering & Inspection Co.
Lymans, Limited
Mine & Smelter Supply Co.
Pennsylvania Smelting Co.
Stanley, W. F. & Co., Ltd.

Ash Conveyors:
Canadian Link-Belt Company

Ashes Handling Machinery:
Canadian Link-Belt Co., Ltd.

Assayers and Chemists:
Milton L. Hersey Co., Ltd.
Campbell & Deyell
Ledoux & Co.
Thos. Heys & Son
C. L. Constant Co.

Asbestos:
Everitt & Co.

Balls:
Hull Iron & Steel Foundries, Ltd.
Peacock Brothers Limited.
The Wabi Iron Works.
The Hardinge Conical Mill Co.
The William Kennedy & Sons, Ltd.

Ball Mills:
Hardinge Conical Mill Co.
Hull Iron & Steel Foundries, Ltd.
The Wabi Iron Works.
The William Kennedy & Sons, Ltd.

Babbit Metals:
Canada Metal Co.
Hoyt Metal Co.

Ball Mill Feeders:
Hardinge Conical Mill Co.
Hull Iron & Steel Foundries, Ltd

Ball Mill Linings:
Hardinge Conical Mill Co.
The William Kennedy & Sons, Ltd.
Peacock Brothers, Limited
Hull Iron & Steel Foundries, Ltd.

Belting—Leather, Rubber and Cotton:
Canadian Link-Belt Co., Ltd.
The Mine & Smelter Supply Co.
Northern Canada Supply Co.
Jones & Glasco.

Belting:
R. T. Gilman & Co
Gutta Percha & Rubber, Ltd.

Belting—Silent Chain:
Canadian Link-Belt Co., Ltd.
Hans Renold of Canada, Limited, Montreal
Jones & Glassco (Regd.)

Belting (Transmission):
Goodyear Tire & Rubber Co.

Belting (Elevator):
Goodyear Tire & Rubber Co

Belting (Conveyor):
Goodyear Tire & Rubber Co.
Gutta Percha & Rubber, Ltd.

Bins and Hoppers:
The Toronto Iron Works, Ltd.
Can. Chicago Bridge & Iron Co., Ltd.
Horton Steel Works, Limited.

Blasting Batteries and Supplies:
Canadian Ingersoll-Rand Co., Ltd
Mussens, Ltd.
Canadian Explosives, Ltd.
Powley & Townsley, Limited.

Bluestone:
The Consolidated Mining & Smelting Co
The Coniagas Reduction Co., Ltd.

Blowers:
Canadian Fairbanks-Morse Co., Ltd
Northern Canada Supply Co.

Boilers:
Canadian Ingersoll-Rand Co., Ltd
Marsh Engineering Works
R. T. Gilman & Co.
The John Inglis Company
Wabi Iron Works.

Blue Vitriol (Coniagas Red):
Canadian Fairbanks-Morse Co., Ltd.

Bortz and Carbons:
Diamond Drill Carbon Co.

Boxes, Cable Junction:
Standard Underground Cable Co. of Canada, Ltd.
Northern Electric Co., Ltd.

Brazilian Rough Diamonds:
Diamond Drill Carbon Co.

Brazilian Mica:
Diamond Drill Carbon Co

Buggies, Mine Car (Steel)
Hendrick Manufacturing Co

Brazilian Ballas:
Diamond Drill Carbon Co

Brazilian Rock Crystal:
Diamond Drill Carbon Co

Brazilian Tourmalines:
Diamond Drill Carbon Co

Brazilian Aquamarines:
Diamond Drill Carbon Co

Bridges—Man Trolley and Rope Operated—Material Handling:
Canadian Mead-Morrison Co., Limited

Bronze, Manganese, Perforated and Plain:
Hendrick Manufacturing Co.

Buckets:
Canadian Ingersoll-Rand Co., Ltd
R. T. Gilman & Co.
Hendrick Manufacturing Co.
Canadian Link-Belt Co., Ltd.
Marsh Engineering Works
Mussens, Ltd.
MacKinnon Steel Co., Ltd.
Northern Canada Supply Co.
The Wabi Iron Works

Buckets, Elevator:
Canadian Link-Belt Co., Ltd
Hendrick Mfg. Co.
Peacock Brothers Limited.

Cable—Aerial and Underground:
Canada Wire & Cable Co.
Northern Canada Supply Co
Standard Underground Cable Co. of Canada, Ltd
Peacock Brothers, Limited

Cableways:
Canadian Mead-Morrison Co., Limited
Fraser & Chalmers of Canada, Ltd
Mussens, Ltd.
The Wabi Iron Works
R. T. Gilman & Co.

Cages:
Canadian Ingersoll-Rand Co., Ltd., Montreal, Que
Northern Canada Supply Co.
Fraser & Chalmers of Canada, Ltd
The Electric Steel & Metals Co
The Mine & Smelter Supply Co
Mussens, Ltd.
The Wabi Iron Works

The plant has a rated capacity of 175 tons of ore daily, and almost from the beginning was able to treat about 150 tons daily with a production of approximately $2,000 every twenty-four hours. The enterprise was financed by business men of Buffalo, being practically a closed corporation.

Kirkland Lake Proprietary.

Operations are well under way on the Sylvanite property. The plant has been overhauled and placed in first class condition preparatory to carrying out a comprehensive scheme of exploration and development work, including the sinking of a shaft at a central point to a depth of 200 or 300 feet.

The Sylvanite lies directly between the rich Wright-Hargreaves mine and the Tough-Oakes and is believed to be almost certain to share in about one-quarter of a mile in length of the main zone of mineralization along which the producing mines of the Kirkland Lake district are situated.

The Kirkland Lake Proprietary, (1919), Ltd., holds not far under fifty per cent. of the Sylvanite stock, while interests in Buffalo are also heavy holders. The mine is being operated under joint arrangement between these two factions and is being managed by Albert Wende, who is general manager of the adjoining Wright-Hargreaves.

TORONTO MINING QUOTATIONS.

Quotations on Active Stocks on Standard Stock Exchange on 15th November, 1921.

	High	Low	Last
Silver.			
Adanac Silver Mines, Ltd. ..	1¾	1⅛	1⅝
Bailey	2	2	2
Beaver Consolidated	21	20	20
Coniagas	1.20	1.20	1.20
Crown Reserve	12	10	10
Hargraves	⅝	⅝	⅝
La Rose	34	31	34
McKin.-Dar.-Savage	18½	17	17½
Mining Corp. of Can.	1.15	1.00	1.10
Nipissing	5.75	5.50	5.75
Temiskaming	26½	26	26
Trethewey	14½	11	11
Victory Silver	26	25¾	26
Gold.			
Atlas	19½	17½	18
Dome Extension	68	68	68
Dome Lake	7½	7½	7½
Dome Mines	20.90	20.30	20.50
Gold Reef	2	1⅞	2
Hollinger Cons.	7.55	7.46	7.54
Hunton Kirkl'd G. M.	28	27	28
Lake Shore M. Ltd.	1.20	1.19	1.19
McIntyre	1.97	1.87	1.95
Moneta	9	8	8
Newray Mines, Ltd.	4	4	4
Porcupine Crown	14	13¼	14
Porcupine Tisdale	½	½	½
Porcupine V.N.T.	17½	16	17½
Preston East Dome	2¼	2¼	2¼
Schumacher	23	23	23
Teck-Hughes	15½	14	15½
West Dome	6½	6½	6½
West Tree Mines, Ltd.	4	3½	3½
Wasapika Gold M. Ltd.	4½	3⅞	4¼
Miscellaneous.			
Petrol Oil	20	19	20
Vacuum G.	2	1¾	1¾

METAL QUOTATION.

Following are the fair average price for ingot metals (in less than car-loads):

Toronto.	Cents per lb. 15th Nov. (Unchanged since last week).
Copper, Electric	17
Copper, Casting	16¾
Tin	35
Lead	6¾
Zinc	7½
Aluminum	27
Antimony	9

PERSONALS.

Mr. J. A. Dawson, of Vancouver, is returning to the west after a trip to Ottawa and Toronto.

Mr. E. L. Bruce, professor of mineralogy at Queens University, has been offered the position of Mining Commissioner of Northern Manitoba.

Nelson, B.C.—Owners of the Rampolla Group of Mineral Claims, Lightning Peak Camp, Arrow Lakes, are proceeding with the development of that property with intelligence and system. Having completed a 400-foot crosscut intersecting the lead another tunnel is to be driven to given increased depth. This will have to be driven some 1,000 feet before it strikes the main vein. There are three known veins on the Rampolla and the proposed work will crosscut them all, as well as traversing 600 feet of new ground.

Rossland.—Eight lessees now are operating the Velvet Mine, near Rossland. The mine is said to be in good condition, six working levels having been run from a 500 foot shaft.

EDITORIAL

NICKEL — AND NAVIES.

That the Conference on the Limitation of Armaments is going to play the dickens and all with the nickel industry seems to be the view of some of the sage and sapient newspaper correspondents who are reporting the proceedings — or such of them as they are permitted to attend — of the Conference. Here is a recent gibe of one of them: "The activities of the International and Mond Nickel Companies will inevitably be curtailed, and the Sudbury district can begin to pray for the discovery of some other veins of mineral wealth within its bounds, as the demand for nickel for use in armor plate and munitions will at once fall to zero." Such fanciful and fantastic deductions must be due, it seems to us, either to ignorance of nickel and its uses, or to something of the amiable spirit which animated the Fat Boy in the Pickwick Papers when he announced to Mr. Wardle's mother "I wants to make yer flesh creep."

There is no likelihood of panic among those who, as being engaged in the industry, may be supposed to be best cognizant of its position and its possibilities. Nor is there any reason for panic. Incidentally, it may be mentioned that, while everyone wishes well to the Conference, it is a conference looking to the *limitation* of armaments and not to their immediate *abolition*. In such armaments as continue to be maintained, after the Conference has separated, nickel will doubtless play its proportionate part. But it is a serious error to imagine that the leaders in the nickel industry have not laid well-considered plans for the creation of profitable markets for nickel in other directions than those devoted to armaments. Indeed, although during the war period the demand for nickel for purposes of war was of such magnitude and persistence that it, for the time being, completely overshadowed the demand for it from all other sources, in the years immediately anterior to the war about fifty per cent. of the nickel marketed was used for industrial and cognate purposes.

Confronted with the necessity that has now arisen, owing to the likely curtailment of the use of the metal for armament, to find new markets for nickel, there is no room for doubt that the nickel industry, as a whole, will prove equal to the task. For the high economic value of the metal and its alloys is a proven and well-ascertained fact and one which is being increasingly recognized by the whole industrial world. More brilliant than platinum, and with a weight approximately equal to that of copper, it is about as hard as soft steel. It is remarkable for its extreme malleability and ductility, which enable it to be rolled into extremely thin sheets, or drawn into very fine wire, of great tenacity. It is well suited to plating on other metals. It is strongly resistant to oxidation in the air, and is passive to caustic alkalies, while weak acids affect it only slightly. For the great variety of uses to which it has been adapted, and is adaptable, it stands first among the common metals.

Moreover, the important alloys, from a commercial and industrial viewpoint, which contain nickel are more numerous than those of any other metal, with the exception of copper. It is useful in such a large number of alloys by reason of the fact that it promotes strength, tenacity, soundness, resistance to corrosion and homogeneity in the product. A very important factor, in connection with its use in alloys, is that it has a coloring power greater than any other base metal in common use, and provides a means of producing many bright, silver-like alloys from metals of inferior color and lustre.

Nickel steel is used not only for armament purposes, in the form of armor plate and ordnance, but also very widely as automobile steel; in locomotive tires, axles, piston rods, etc.; in bridges; in rails; in railroad frogs and switches; and in resistance wire. Nickel silver, which, in other days, used to be known as German silver, is used in jewellery, novelties and table wear. Cupronickel is used in coinage, pyrometer wire and resistance wire. Anodes are used in nickel plating, and catalyser is used for hardening fats and oils. Malleable nickel is widely used in chemical apparatus, in coinage, in cook-

ing utensils, in electrical instruments, in spark plug wire, in valve trim and so forth.

Of course, those mentioned are just a few of the hundreds of uses to which nickel and its alloys are put. But some mention should be made of the possibilities of Monel Metal of which the International Nickel Company has done so much to stimulate a wider use. The use, in this form, of nickel is, in fact, one of the most important of the uses to which the metal is put. Monel Metal, by reason of its non-corrodibility, its durability, its acid resisting qualities, its resistance to super-heat, its tensile strength, and its resistance to high heat, and its electrical properties, finds already, and, in enormously increasing measure, is destined, to find in the future, high favor in industrial pursuits ranging all the way from automobile manufacture to ship-building, and from the manufacture of coal-mining equipment to that of restaurant apparatus. Alike in plant equipment and in products, it is used by an enormous number of manufacturing establishments. But, perhaps, its most important present use is in power plants, where, on account of its property of withstanding corrosion and the erosive action of super-heated steam, it is used extensively as valve seats, valve rods and discs, pump rods and liners, turbine blading, and so on. In the chemical industry, because of its resistance to chemical fumes, alkalies and most acids, its uses are almost endless. In particular, it is of high value and utility in the manufacturing parts of bleaching and scouring machinery, and in dye-house and similar industrial chemical equipment.

The whole subject is a fascinating one, and it has, perhaps, momentarily led us into some little divergence from our main point, though one which is not altogether impertinent to it. What we are concerned to emphasize is that the uses of nickel and its alloys in the arts of peace in the future are certain as can be to prove more important and vastly more remunerative to those engaged in the nickel industry, as well as vastly more beneficial to humanity at large, in the future than their uses in the arts of war have proved in the past. The present times are abnormal, but when once conditions approximating to the normal supervene, it will speedily be seen that, whether in production or in marketing, the nickel industry and those engaged therein have little to fear.

THE POWER QUESTION.

The power situation at Porcupine is not as bad as anticipated, thanks to heavy rainfalls. The precipitation has given rise to hopes that the present supply of power can be continued through the winter months. There are as yet however, no arrangements made for providing the additional power which the mining companies require.

The shortage of power last winter resulted in considerable loss to the gold mine operators, and the power question has been consequently attracting much attention. Two of the companies, which suffered large financial loss last winter from power shortage, announced their intention of providing against a repetition of winter shortage and also of providing additional power for larger operations, by developing power themselves. This has not been done, and the company which at present supplies power to the mines has not yet undertaken to supply such additional power as the plans of the companies call for. The present situation must be considered unsatisfactory to all concerned.

It is reasonable to assume that the various parties interested have conferred on the problem and found no solution. No progress having been made, it seems desirable to enquire into the reason for the lack of progress, with a view to having obstacles removed, and an amicable agreement arrived at that will result in rapid progress to the desired end.

The manager of the power company has been quoted as being ready to undertake to propound a satisfactory solution of the problem, if the mining companies will make known their requirements. The plans of the Hollinger are, apparently, not well known to the power company, and the relations between the two companies were not improved by the dispute arising over last winter's shortage. The plans of the Hollinger, on the other hand, are indefinite, owing to the way in which the Ontario Government has treated the Hollinger company's application for rights to develop power. The Government, by taking a very long time to do nothing, has naturally been criticized for failure to act in a matter which is of great importance to Northern Ontario.

In the power question at Porcupine, the Ontario Government will find something worthy of its attention, if it makes due investigation. It will find that development is being retarded by lack of power, and it will find several interests concerned in the plans made for providing the required power. If Mr. Drury endeavors to find a solution of the problem, he will have to listen to arguments from several quarters. There are, without doubt, reasons why it would take some time to arrive at a decision; but the matter is of sufficient importance to justify the claim that the Government should take a more active interest in obtaining the facts and endeavoring to clear the way for increased activity in the development of the North's resources.

In this issue of the Journal, our Cobalt correspondent suggests that the mining companies and the power company might be able to make satisfactory arrangements for the development of the power at Sturgeon Falls on the Mattagami River the rights to which McIntyre-Porcupine Mines Ltd. applied for some time ago. Possibly, Mr. Black, manager of the power company, had this and other schemes in mind when he stated that his of company could find, for the mining companies, all the power which he thinks they want. Mr. Black admits, however, that he has not been able to find out just what the Hollinger company is desirous of obtaining. To make headway with such a plan, it is evidently necessary that the Government must indicate what it intends

to do with the Hollinger application. The Government cannot come to any decision until it knows the facts, and it cannot learn the facts without giving the matter more attention than has been devoted to it during the past year.

To develop a sound policy with respect to Northern Ontario is an aim worthy of Mr. Drury and his cabinet. Investigation of this power question will not only help the mining industry; but will enable the Government to gain useful information concerning a part of the Province in which progress can be hastened or retarded greatly by the Government. Investigation may reasonably be expected to result in action that will meet with some measure of approval. The present policy of avoiding the difficulties by delaying action does not meet with approval in any quarter. If the delay were due to effort being made to get the facts, there should, by this time, have been a very full investigation, indeed.

Commenting on the power situation at Porcupine the "Northern Miner" says: "If Hollinger Consolidated Gold Mines directors felt sure that they could get a continuous and sufficient supply of hydro-electric energy they would immediately take steps to increase the output by mill additions. They feel that the mine is in shape to warrant increased production and they have in mind the treating of 6,500 tons daily as against a present record of 4,000 tons. They plan increasing the output to 6,500 tons next spring, but do not feel like taking the step until they can see their way clear in regard to power supply. The situation, as here outlined, is officially given The Northern Miner.

"Hollinger and the Northern Canada Power Co. are in a legal dispute from which might arise a clear understanding in regard to future power supply. If the Power Company arranges for the development of the Sturgeon Falls power, owned by McIntyre, at least the immediate needs of Hollinger, McIntyre and Dome would be satisfied. It is understood, in mine operating circles, that the diversion of other streams into the Mattagami above Wawiatin Falls would hardly add sufficient energy to allow the three big Porcupine mines to expand as they hope to do, and that ultimately more power plants will have to be installed."

The situation is one which calls for action. It seems to us that it is of sufficient importance to merit Government attention, for a solution of the problem is in the interests of the Province.

EDITORIAL NOTES.

Both at Cobalt and Gowganda some interest is being shown in the possibility of finding gold deposits in the silver areas. Manager Kee's reference, in his annual report, to the occurrence of small quantities of gold found at the Kerr Lake mine and the discoveries of gold at several places in the Gowganda area should lead to further discoveries.

The Gowganda road has been much improved this summer, but work was stopped too soon. It is now possible to make the trip in by automobile in two hours. This is something which operators in the area have cause to be thankful for. A little more work is still much needed and it is to be hoped that this will be attended to at the earliest possible opportunity next year.

An engineer, who recently visited one of the mining areas in Ontario in which some prospecting is going on, was surprised to see that very little use was being made of the gold pan. The pan in experienced hands is a very useful article, and prospectors who do not use it are handicapping themselves. Some of our prospectors have found the mortar and pan very valuable assistants.

Coal mine operators in Nova Scotia and British Columbia are naturally opposed to tariff changes that would add to their present problems of meeting competition with American coal. In the west there is also to be met the competition with fuel oil which is at present being sold at a low price.

There are signs of improvement in the steel industry. This unfortunately does not mean that there will be any large production of iron ore in Canada in the near future. It is, nevertheless, of great importance to our coal mining industry.

PORT ARTHUR MINING NOTES.

By J. J. O'CONNOR.

Work has commenced on the opening up of the old Shuniah Mine, situated three and a half miles north of Port Arthur. This is one of the pioneer silver discoveries in the Thunder Bay silver area, being the second silver find of importance made in this district. The first being the Thunder Bay Mine, made by Mr. Peter McKellar on September 20th, 1866. The Shuniah find was made by the late George A. McVicar, in May, 1867. The vein strikes nearly east and west, and had a width of from 20 to 24 feet on the surface, carrying high silver in native and argentite.

The surface showings were so rich that large quantities of silver were taken out by means of the pick. At the time this work was in process, an excursion from Houghton, Mich., arrived at what is now Port Arthur. The excursionists went in a body to see the wonderful silver find. One of them, an American gentleman of some mining experience, offered the late John McKellar, then in charge of the work, $3,000, to be allowed to work from 7 a.m. until 6 p.m. with a pick, and keep what silver he was able to take out during that time. This offer was refused by Mr. McKellar.

The property was sold to Boston, Mass. interests, and the Duncan Mining Company was formed for the purpose of developing and operating the deposit. This company continued, with varying success, until 1870, when the mine was again sold to the Shuniah Mining Company. Mining operations were carried on by this company until July 1881, under the management of John S. Sargent, who prosecuted sinking to a depth of about 450 feet, and did some diamond drilling below the workings. On a report by John C. F.

Randolph, E.M. of New York, the mine was closed down on the above date.

The present operations are being carried on outside the former workings, on a part of the vein hitherto untouched, and which is claimed to be of a stronger character, and that is expected to carry higher values than formerly found below the surface.

The late N. N. Stewart, a mill wright, in charge of the construction of the stamp mill at the Shuniah, claimed to have found an enormously rich surface showing on another vein on this property, which he offered to point out to the management for a consideration, which they declined to give, and Mr. Stewart passed away without disclosing its location. In conversations with the writer, Mr. Stewart frequently made most positive assertions regarding his find, and the general opinion among those who knew him, had no doubt as to his veracity in the matter of the find, although he might be mistaken as to its value.

ADVANCEMENT OF SCIENCE.

The American Association for the Advancement of Science has met in Canada three times before, twice in Montreal — in 1857 and in 1882 — and once in Toronto, so that the meeting for the fiscal year 1922 will be the second Toronto meeting. This meeting will be held the 27th to 31st December, 1921.

General Scope.

Through its meetings and through its publications, the American Association promotes intercourse and co-operation and the feeling of fellowship among scientists and those interested in the advance of science and education. North America and South America are its special geographic fields, but members may be citizens of any country.

The Association has become a great affiliation of American scientific societies, and its meetings have become increasingly characterized as conventions of many special organizations. A large number of the associated societies regularly meet with it and the facilities of the Association are always at the disposal of these societies, for the arrangement of meetings, the preparation of programs, etc. Many associated societies are also officially affiliated and are represented in the Council of the Association, thus taking part in its direction.

Importance of Meetings.

The regular annual meetings and the other meetings that are occasionally held constitute a powerful means of disseminating knowledge, of cultivating the scientific attitude of mind, and of promoting a general appreciation of the great importance of science and scientific study. It has frequently been stated that the progress of democracy depends mainly upon these things, and the truth of this statement becomes increasingly emphasized as science and the work of scientists becomes better understood by the public.

The meetings also furnish the only means by which a large number of active workers in all branches of science are brought together from distant regions, with consequent opportunities for the formation and renewal of numerous personal acquaintanceships and friendships. These meetings do much toward preventing the development of the undesirable aspects of personal rivalry and toward the encouragement of friendly co-operation among those interested in science and education.

Endowment and Grants for Research.

The American Association is entrusted with a considerable permanent endowment, which has been derived from gifts and bequests of public spirited persons and from payments made by Sustaining Members and Life Members. The income derived from these funds is employed to advance scientific research. It is annually appropriated for grants, which are made to individuals or scientific organizations, to aid research projects. Applications for financial assistance in scientific investigations are referred to a special Committee on Grants, which considers the applications and apportions the available funds. For the year 1921 this committee thus apportioned the sum of $5,000, in 24 different grants. Recipients of these aids to research make reports to the Association, showing how the funds have been expended and the nature of the results obtained.

It is desirable that the endowment of the Association be increased whenever possible, and it is hoped that this opportunity for continuously aiding the increase of useful knowledge may be widely appreciated. The fundamentally democratic nature of the American Association and its broad, general scope constitute an unusual guarantee that funds entrusted to it will be reasonably and efficiently employed in ways calculated to advance science and improve education.

The Association offers the most efficient means by which individuals, scientific societies, and scientific institutions may unite to hasten the growth of scientific knowledge and to increase public appreciation of what the nations owe to science and what may be expected of science in the future. The insistent urge of many individuals and organizations, united in a comprehensive association for the advance of learning, is capable of exerting a most powerful influence for good in national and international development.

The Membership List of the Association forms one of the most valuable instruments of its kind, as an address list of American Scientific workers and friends of science. The 1921 list contains about 12,000 names and addresses and furnishes an invaluable reference volume at a very low cost. Fellows of the Association are specially designated. The publication of the membership list is a valuable and important service performed by the Association in the interest of intercourse and co-operation among men of science in America.

Dr. J. C. Fields, F.R.S., Professor of Mathematics University of Toronto and President of the Royal Canadian Institute is Chairman of the Local Committee for the Toronto meeting 1921 of the American Association for the Advancement of Science.

Mr. H. L. Seymour, C.E., is the Secretary, with address, the Royal Canadian Institute, 198 College Street, Toronto, Ontario.

The Blue Diamond Coal Co. is reported to be producing 1200 tons per day and making large profits. As this mine is jointly owned by McIntyre and Temiskaming companies, its successful operation is of interest to a very large number of shareholders.

The "Northern Miner" reports the resumption of work at Wisconsin-Skead and Crawford properties and arrangements being made for the reopening the St. Anthony and Bourkes mines. These are all gold properties.

McIntyre-Porcupine May Hold Key to Solution of Power Requirements of Porcupine

It has been learned on good authority that there are no insurmountable obstacles in the way of the development of an abundant supply of hydro-electric energy for use at the mines of the Porcupine district provided the concerns involved are prepared to co-operate with each other.

This statement is made advisedly, having nothing whatever to do with the viewpoint of one or another of the companies involved, but deals along broad lines in an effort to point out the way to a solution of the difficulties which are at present delaying a start on power development which is essential to further growth of the gold mining industry of the Porcupine gold area.

The present supply of power, due to the fall having brought more rain than the general average, is believed to be sufficient to carry the producing mines through the winter at full capacity. However, all the producing mines are planning big enlargements to their plants, and, instead of using close to 13,000 h.p. as at present, will probably require an additional 5,000 h.p. by the end of another year. In addition to this, there are a number of mines that are at present idle which will possibly be re-opened during the coming year.

Thus, if the present system of water storage, water diversion and power development is taxed to the full limit to meet current demands, it is obviously imperative that additional developments are unnecessary if the natural growth of the industry is to be made possible.

A lot has been written in regard to the Ontario Government, through the T. and N. O. Railway, placing obstacles in the way of a leading mining company securing the right to develop energy on the Abitibi River. it is true that certain reservations have been made along the Abitibi for protection of the T. and N. O. Railway at such time as the plan to electrify the system is carried into execution. At the same time, an opportunity to develop abundant hydro-electric power for use at the gold mines of Porcupine dies right in the vicinity of the mines without engaging in power development on the far distant Abitibi where the initial cost of building a long transmission line and its constant upkeep renders the plan undesirable, if at all possible to avoid.

I have learned through careful enquiry that the Sturgeon Falls on the Mattagami River which flows right through the Porcupine field, has been surveyed and has been found to have sufficient flow and fall to generate approximately 7,000 h.p. I have also learned that according to careful estimates recently made, this development would not cost more than approximately $1,100,000. Moreover, although the right to develop Sturgeon Falls is held by the McIntyre-Porcupine Mines, I have been led to believe that this company will not stand in the way of any company which may desire to proceed with the development. All that the McIntyre would ask would be first call on its own power requirements which would be from 2,000 to 3,000 h.p. or possibly an ultimate maximum of 4,000 h.p.

The development of Sturgeon Falls, added to represent developments would remove all anxiety of power shortage and would permit all the mines to proceed with the plans to increase production. The McIntyre hesitates to go into the business of power development on its own account. The Northern Canada Power Company is now involved in heavy litigation launched against it by the Hollinger Consolidated, and which leaves the power company in a position where it may be considered unwise to avail itself of the opportunity to develop Sturgeon Falls.

It is my opinion that if the difference between the Hollinger and the power company were settled, and were the Hollinger and the McIntyre to draft an outline of their probable power requirements and to agree to take all their requirements from the power company, there would probably be steps taken almost immediately by the Northern Canada Power Company to provide the necessary additional energy. Failing in this, provided the Hollinger may be determined to set at rest any danger of a recurrence of a power shortage, the Hollinger and the McIntyre might reasonably enter into some joint arrangement for the development of Sturgeon Falls on a fifty-fifty basis, each taking half the power generated and then securing the balance of their requirements from the Northern Canada Power Company's plants.

Thus, two solutions are apparent. First is a settlement of differences between the Hollinger and the power company and the immediate development of Sturgeon Falls by the Northern Canada Power Co. Second, would be the development of Sturgeon Falls jointly by the Hollinger and the McIntyre.

FORMER TRAIL MAN SUCCEEDS TO TITLE.

The news of the death of Lord Ebury as cabled from London this week came with considerable interest to the older residents of Trail, for his successor, Hon. Francis Grosvenor, was a former resident of this city. Coming to Trail in 1903 as a lad of 20, he was employed at the smelter as a metallurgical chemist. In 1907 he left to become chief chemist at the Hall mines in Nelson.

As a land expert, he made reports for a London firm on the Columbia & Western land grant at Nelson, as well as the Fort Sheppard land grant and the grants in the Peace river country. In 1911 he became assistant managing director of the Norton Griffiths Contracting company in western Canada, and was employed by the late Duke of Sutherland to organize an imperial immigration scheme to Canada in 1912. He was also active in Vancouver real estate circles.

He was a licensed assayer and a justice of the peace in the province of British Columbia until the outbreak of the war, when he joined the forces. He was a lieutenant in the 72nd Seaforth Highlanders, Vancouver regiment, before going overseas. He later became a brigade major in the Sixth Canadian Infantry brigade on active service. He was wounded in November, 1915. He was appointed aide de camp to Brig. Gen. H. D. B. Ketchen in 1916. He was thrice mentioned in dispatches, and won the Military Cross and bar, the Distinguished Service Order and the Croix de Guerre with palms.

He has Canadian homes at Atlanta beach, near Nelson, and Riondel, B.C. He was a member of the Union club in Victoria.—Trail News.

Coal Carbonization at Low Temperatures

By JOSEPH D. DAVIES
(Fuels Chemist, U.S. Bureau of Mines, Pittsburg, Pa.)

For the past twenty years an enormous amount of experimental work has been done in this country and in Europe on the carbonization of coal at low temperatures. Most of this work has been carried out on a laboratory scale, or at least on a semi-commercial scale, and only recently have results been obtained that can be used directly by the carbonization engineer. One object in view in the experimental work has been to learn from a purely scientific standpoint more of the composition of coal and its thermal decomposition. Another object has been the discovery and commercial development of more economical methods for processing fuels than the well-known high temperature methods. This paper deals more particularly with the latter phase of the work.

Parr and his co-workers in this country, Stansfield in Canada, Wheeler, Jones, Burgess, Bone and Lewes in England, and Fischer and Gluud in Germany, have been particularly active in research on the scientific aspects of the problem and on the technical application of their results as well. The problem of coal constitution and thermal decomposition is a long way from solution, although considerable progress has been made. Of the chemical constitution of coal, little is known as yet, but the yield of distillation products obtained under fixed temperature conditions, as well as their general nature has been empirically worked out; the actual chemical reactions involved, however, have not been fully explained.

The technical application of low-temperature carbonization is still in its infancy and development has been slow, mainly for three reasons—(1) adequate fundamental knowledge of coal constitution and thermal decomposition is lacking; (2) evolution of suitable retorting apparatus is slow, owing to the low heat conductivity of coal and the consequent diffieulty of designing retorts which have appreciable capacity and also the requisite low temperature gredients; (3) a market for the rather special distillation products, however valuable they may prove to be in the future, does not exist and must be created.

Tar Oils.

The tar oils for what is perhaps destined to be the most important product of low-temperature carbonization technically, since on account of their similarity to petroleum products they can be used largely as substitutes for petroleum oils in the industry.

It is now pretty well established that these primary tar oils from bituminous coals consist chiefly of phenols and hydrocarbons of the paraffin, napthene and olefin series, together with substituted aromatic compounds which are for the most part methylated. According to Gluud, 10 to 15 per cent of the hydrocarbon portion of the tar consists of pure paraffins, the lighter part of the higher percentages of napthenes, unsaturated bodies and hydro-aromatic compounds. The amount of phenols in the raw tar varies from 15 to 50 per cent, according to the volatile content of the coal, the remainder being hydrocarbons. The hydrocarbon portion of the tar is very similar chemically to Russian petroleum; it is likewise very complete and only a very few pure chemical compounds have been separated from it and identified. Bituminous coals yield around 10 per cent primary tar. On refining this tar by distillation with superheated steam, a method which he recommends, Gluud obtains the following products:

Refined products obtained from low-temperature tar from gas coal.

Boiling range (deg. C.)	Yield per cent of tar	Product
20 to 100	3	Paraffins from the gas.
100 to 200	10	Light oil.
200 to 300	12.5	Low viscosity oil (solar oil, motor oil, polishing oil) containing 1 per cent fluid paraffin oil.
300 to dry point	(15.0	Lubricating oil (viscosity, V_{50} = 20 to 30 deg. E.)
	(	containing 1.5 p. c. solid
	(	paraffin.
	(9.0	Red resin.

In addition to the above products, 50 per cent of the tar was obtained as phenolic compounds boiling between 200° C. and the dry point.

The above results agree fairly well with those obtained by Parr, and may be taken as representative of low-temperature tar oils obtained under conditions which are within the meaning of our definition. Their technical application will be discussed later.

Coked Residue.

The coked residue in general amounts to from 70 to 75 per cent of the coking or semi-coking coal charged; it is not so hard as metallurgical coke and contains from 10 to 18 per cent volatile matter. This coke is easy to burn without smoke, ignites readily, and should make an ideal domestic fuel.

It is claimed that coke suitable for this purpose can be made from coking coals unsuited for the making of metallurgical coke. Parr claims to be able to make a good domestic coke from Illinois coals of high oxygen content, and samples shown the writer would seem to bear out this claim. The main feature in Parr's process is a preliminary heating to 300 deg. to 400 deg. C., after which the coking takes place for the most part autogenously, due to heat of reaction of the coal undergoing carbonization.

Gas.

Writers differ considerably as to the amount of gas produced, but it is probably safe to assume that the yield for fair gas coals is between 5,000 and 6,000 cubic feet of 650-750 B.t.u. gas, per ton of coal carbonized. Bone conservatively puts the gas yield at from 3000 to 4000 cubic feet per ton. The composition of this gas, according to Lewes is approximately as follows:

		Per cent.
Hydrogen		27.5
Saturated hydrocarbons		
Methane	48.0	
Higher members	10.1	58.1
Unsaturated hydrocarbons		3.0
Carbon monoxide		7.3
Carbon dioxide		2.5
Nitrogen		1.6
Total		100.0

Uses of Low-Temperature Products.

One must discount to some extent the claims of exponents of the various low-temperature processes as to the special uses to which their products are suited, and as to what extent they are destined to displace other materials for which the demand is well established. As a matter of fact, there is now no well established demand either in this country or abroad for low-temperature products as such or as substitutes for other materials. The writer believes that development, though it has been slow and beset with technical difficulties, has been in advance of the demand for materials produced. Any process, in order to be a success financially, must now bear the burden of creating a demand for its products, and this has been the chief reason for slow development of low-temperature methods up to the present time. As for the future, perhaps in the near future, there is every reason to believe in the success of a low-temperature carbonization industry. The main factor which will bring this about is the rapidly increasing demand for liquid fuels of all kinds. Every resource will be drawn upon, and coal, particularly of low rank, will probably be for a long time among the cheapest of raw materials. It may therefore pay in time to "process" coal for oils as the main product. So long as there is no definite demand for the special products which "processing" will supply, one might as well think of going to the trouble of refining cast iron; making a fine grade of tungsten steel, for example, to use for window weights, as to think of "processing" coal. This of course does not apply to well established methods for processing coal where gas or metallurgical coke are the special products sought.

It must not be expected that the profits to be derived from low-temperature processing of coal will be large. To quote Sir George Beilby, Director of the British Fuel Research Board, "Low-temperature carbonization can only be established on a sound commercial basis with low operating costs and a very moderate margin of profit."

The refined light oils from the tar may be sold as motor spirit, for which there are good prospects of ever increasing demand. The amount of oil available for this purpose may be taken at around 3 gallons per ton of coal carbonized, the exact amount depending upon the volatile content of the coal. There is a question in this connection, as to how far the refining of oils of this character must be carried to fit them for use in motors. It is possible and even probable that refining methods other than those now used for petroleum, and high-temperature light oils, may be developed which will release a larger proportion of the low-temperature light oils as refined motor spirit stock than can be now counted on. The Bureau of Mines is just at present working on the problem of motor spirit refining in connection with oils similar to low-temperature light oils. The heavy low-temperature oils, as previously indicated, consist chiefly of acids (phenols) and neutral hydrocarbon oils. The phenol content is high, it amounts as much as 50 per cent of the total tar yield of 24 gallons per ton of coal, according to Glund. He also finds that the higher the total tar yield, the higher its content of phenols.

One large use for low-temperature tar acids will doubtless be in connection with timber preservation. According to Coffin, between 90 and 100 million gallons of such oil was used in 1913 in this country for that purpose, and two-thirds of this amount was imported. Evidently there is a present demand for low-temperature tar acids, and the only question remaining to be decided relates to their suitability for the purpose. Coffin states that they are even better than high-temperature tar creosote. Other uses mentioned for these tar acids are, insecticides (including dipping oils for live stock), disinfectants, and flotation oils. It is not clear that there is an appreciable shortage in the present supply of these chemicals, although a growing demand may probably be assumed.

According to Glund, the heavy hydrocarbon oils, and in fact crude tars from which the acid is not removed, have found extensive use in Germany as lubricants during the war. He adds that even now most of the low-temperature tar produced is used directly for that purpose, although really high-grade lubricating oil can be made from the crude tar on distilling with steam and removing the phenols.

The total tar oils, with very little refining, may be used as fuel oils, although demand for them for other purposes should preclude such use. Armstrong, of the Low Temperature Carbonization, Limited, states that at the Barnesley plant, fuel oil complying with the Admirality specification, is made by steam-distilling the crude oil till sufficient light oil is removed to bring the remainder within the Admirality flash point specification and then decanting the water.

It is claimed both in this country and in England that low-temperature coke is an ideal fuel for domestic heating. This seems reasonable, particularly in view of the quality of coke obtained by Parr from coals rather inferior from the coking standpoint. It should be feasible and profitable to coke low-rank semi-coking coals primarily for solid domestic fuel and light oils. However, the American public is slow to take up the use of coke, and the same seems to be true in England. The public aversion to coke may be due partly to prejudice and partly to lack of knowledge of the best ways to burn it; the writer is inclined to believe both factors are responsible. In any event, the public must be educated to its use before there will be a good demand for low-temperature coke for domestic heating.

The small amount of surplus gas available for distribution (at most 3,000 cubic feet per ton of coal carbonized), makes the gas product of lesser importance. It is, however, of good quality and suitable for distribution for domestic heating.

Coals Suitable for Low-Temperature Carbonization.

What has been said so far applies to semi-coking coals such as will not produce satisfactory metallurgical coke; and it would seem that low-temperature carbonization methods would apply best to coals of this rank. It is claimed that they produce a good domestic coke and at the same time a high yield of oil. A further consideration is that their use would not interfere with the supply of high grade coking and gas coals. Considerable experimental work has been done on the low-temperature processing of sub bituminous coals and lignites, although the information gathered so far regarding these coals is not so complete as that for coals of higher rank.

Higher Grade Fuel from Lignite.

In our western States where there is a scarcity of high-grade solid fuels and where our lignite is plentiful, there is a real need of a process for making a higher grade fuel out of lignite. Possibly low-temperature processing may solve the problem. Babcock

for the Bureau of Mines, has given "Especial attention to the study of utilizing lignite in the form of residue briquets and in the manufacture of by-product gas." More recently Stansfield, for the Canadian government, has done some excellent loboratory work on low temperature carbonization of lignite and as a result of the work, a 200-ton carbonizing plant at Bienfait, Saskatchewan, has been erected. Information on large-scale results from this plant is not yet available.

Apparatus.

It is hardly necessary here to deseribe all the apparatus which has been proposed for low-temperature carbonization or even a major part of it. In all low-temperature installations in so far as the writer knows the retorting apparatus is in the process of evolution and it is perhaps too much to say of any low-temperature process that it has attained entire technical success. Processes referred to in what follows will therefore be deseribed briefly and for the purpose mainly of illustrating a principle in design. Any attempt at this time to decide on the relative merits of different commercial processes proposed would not, in the writer's opinion, be justified.

The Carbocoal Process.

A plant with a capacity of 500 tons per day, based on the carbocoal process has been in operation at Clinchfield, Virginia, for the past year and represents perhaps the farthest advance in commercial low-temperature development in this country.

The Carbocoal process includes three distinct stages: (1) Primary carbonization; (2) Briquetting; (3) Secondary carbonization.

The coal to be processed is first crushed to ½-inch size or smaller, and then fed into a horizontal retort through which it is forced continuously by heavy cast-iron paddles mounted on two parallel shafts. These shafts are driven by a motor suitably connected by gearing at the intake end of the retort. The vertical section of the retort is approximately cardioid. It is heated by gas at the bottom and sides to a temperature of 850 deg. to 900 deg. F. (450 deg.-480 deg. C.) The capacity of each retort is one ton per hour. Uniform and rapid heating is in this case secured by agitation of the charge and the fact that the solid residue obtained is thereby broken up, is in no way objectionable since it is subsequently briquetted.

The product of the low-temperature retorts is immediately mixed with 10 per cent of pitch (obtained in refining the tar recovered in the process) and briquetted. The briquets are then carbonized at 1800 deg. F. (980 deg. C.) in inclined retorts.

The yields of products reported for this process agree fairly well with low-temperature yields previously given, and it remains only to be said that the highly refined briquets obtained as the end product appear to be in good demand for domestic fuel. The writer has been told that they are competing successfully with the best anthracite coal.

The Summers Retort.

A continuous low-temperature retort designed especially for producing a dense coke by compressing the charge during coking has been proposed by Summers, and the writer is informed that a plant designed by him is being erected at Hamsburg, Ill.

Briefly, the Summers' retort consists of a horizontal coking chamber built of masonry about 40 feet long and of rectangular vertical section, 17 inches wide by 27 inches high. On the floor of the retort is a reciprocating iron conveyor extending throughout the retort length. A heavy cast-iron fin attached to this conveyor serves to take the raw coal from a hopper at one end of the retort and force it forward toward the other end where it is discharged through a water seal as coke. The conveyor is actuated by a powerful hydraulic ram. Heating is effected in large flues running horizontally through the retort side walls, and built-in regenerators are provided at the top. Extending along the roof of the carbonizing chamber is a channel which serves to assemble the distillation vapors and convey them to a standpipe and hydraulic main located at the feed end of the chamber. Provision is made for shifting the zone of highest temperature to any desired section of the oven walls so that the heating of he charge can be well controlled.

Mr. Summers states that "domestic coke of unusual density or a metallurgical coke can be made if desired." This is particularly interesting, since it lays open the possibility that in the future, low-temperature coke of such quality may be made that it will compete with that from high-temperature processes.

The yield of oil (20 gallons per ton) is much greater than that obtained in high-temperature processing, and at the same time a large yield of good gas is realized, one ton of coal yielding 8,000 to 10,000 cubic feet of 590 to 630 B.t.u. gas. It would seem, however, that in view of this high gas yield, distillation temperatures above the low temperature range were maintained and that the tars must have been decomposed to some extent.

The Green-Laucks Retort System.

An experimental plant of the Green-Laucks system is operated at Denver, Colorado, by the Denver Coal By-Products Company.

The retorts are vertical, 1 inches in diameter and 18 feet high, four retorts being mounted in each setting. A hollow worm mounted axially in each retort serves to force the charge through it and at the same time to conduct the distillation vapors to the outside. A vacuum of as high as 24 inches of mercury has been maintained in the retorts. This system involves, therefore, some agitation of the charge, and in addition, distillation under reduced pressure.

The Wallace Retort.

The most interesting feature of the Wallace retort system is a perforated off-take located at the center of the retort, the idea being to insure passage of the vapors from the point of evolution in a direction opposite to that of the heat flow.

The Wallace retort consists of a cast-iron cylinder mounted vertically in a brick setting and is heated by combustion gases in an annular combustion chamber passing entirely around the retort. To the top and bottom of the retort are bolted cast-iron plates, the joints being made gas tight with asbestos gaskets The perforated off-take pipe is closed at the top and passes downward through the center of the retort and to the outside through the bottom plate. Provision is made for collecting the tar-oils that condense in that portion of the offtake which is inside the retort, so there is little chance for the oils to become superheated.

The writer is informed that a Wallace plant at Petersburg, Virginia, has very recently been put into operation. All the analyses of products for the preliminary runs are not yet available, but it appears that the coke obtained is of good quality, the gas yield abnormally high (4.62 feet of 600 B.t.u. gas) and

the oil yield perhaps somewhat low (20½ gallons per ton.)

The Stansfield Carbonizer.

In a continuous apparatus for carbonizing lignite evolved by Stansfield, the material is fed onto the floor of a rectangular retort inclined at an angle of 45 degrees, or slightly greater that the angle of repose of crushed lignite. The retort floor is gas heated from below and the charge flows over it by gravity, the thickness of the layer being fixed by numerous baffles placed at right angles to the floor. The baffles also effect stirring of the charge and uniform heating. The rate of flow of material through the retort is regulated by the rate of withdrawal of carbonized lignite at the lower end of the retort.

The Traer Retort.

Traer carbonizes coal continuously in a retort 60 feet long, and of rectangular section 20 inches wide by 48 inches high. The charge is carried through the retort in cast-iron boxes mounted on iron cars with which the retort is kept filled, freshly charged cars being fed in at one end and cars of coke being removed at the other. Each end of the retort is fitted with a double door system. Passage of heat to the charge is here aided by the high conductivity of the iron containers.

The same device is used by the British Fuel Research Board to obtain efficient heating in their experimental low-temperature retort. Here the coal is charged in shallow iron trays sub-divided by numerous partitions, and the coked residue is obtained in uniform size.

Gas Generators with Built-in Low Temperature Carbonizing Retorts.

A method of combining low-temperature carbonization with complete gasification of coal has been developed in Germany and is now, according to Gluud, of considerable industrial importance. The apparatus is being built by the A. G. fur Brenstoffvergasung, Berlin, N.W., 40 Roonstr 4, and also by the Dutch Mondgas a, Nebenprodukten, Ges., m.b.H. Berlin. The machine of the Bernstoffvergasung Company is an ordinary gas producer with a rotating top. Attached to this is an annular iron retort extending downward into the body of the generator with means provided for retaining the charge and feeding it uniformly over the surface of the fuel bed in the generator as carbonization is completed.

A hopper similar in design to the charging bell of a blast furnace, serves to admit fresh coal as required to the retort. The retort is heated partly from the outer surface by conduction from the hot generator gases and partly by direct contact with a portion of the generator gas which is drawn through it. About one-third of the generator gas is by-passed through the retort for this purpose, and after the usual scrubbing for low-temperature oils it is re-united with the main supply which comes directly from the generator. It is claimed that the loss of gas due to re-carbonizing the coal can be replaced with an additional 10 per cent of raw coal or even less.

The improved Mondgas machine has a bell-shaped low-temperature retort built into the stationary generator cover and extending vertically downward into the generator body. The heating is done in the same manner as in the machine of the Brenstoffvergasung Company just described. Stirring of the charge and a uniform feed of coked residue are maintained by means of a gear-driven stirrer and distributor mounted axially in the retort. With this arrangement, coking of the coal is completed in 2½ hours and the generator gas contains "hardly traces" of tar; whereas without stirring of the charge the coking time is 3½ hours and even then the generator gas is dirty.

The gasses were compared for two parallel runs with brown-coal briquets, the low-temperature retort being operated in one test and not in the other. In the latter test nine per cent more gas was obtained, but it contained more tar and water, 80 grams of water and 5 grams of tar per cubic meter; whereas in the other test the total gas obtained from generator and low-temperature retort contained only 30 grams of water and 3 grams of tar per cubic meter. The heating value of this gas was about 1.5 per cent higher than that of the gas obtained by direct gasification. It would seem that this process might with profit be investigated further for the manufacture of industrial gas in this country. A clean, dry gas is always to be desired, and it does not appear that the scrubbing of the gas in this process presents much difficulty. Furthermore, it is only necessary to scrub one-third of the gas produced. The process might even prove applicable to our western lignites.

Conclusions.

Although increased interest has been manifested in low-temperature carbonization during the past year, progress toward commercial development has been slow. This is probably due in part to market conditions and in part to difficulties experienced by builders in perfecting their apparatus mechanically.

In order that a low-temperature industry may be firmly established, it is necessary that the popular prejudice against soft coke be overcome, and it will take time to accomplish this.

It does not appear that low-temperature methods are destined soon to occupy an important place in the gas industry in so far as gas for city supply is concerned. They may, however, be used to advantage in the production of industrial gas.

The writer is indebted to Professor S. W. Parr and Messrs. C. V. McIntire, R. S. McBride, G. W. Wallace and Walter Runge for their assistance in assembling material for this report. Reports of Investigations, U. S. Bureau of Mines.

TREATING DRY SILVER ORE.

L. H. Biggar, manager of the Ottawa mine, Springer creek, five miles east of Slocan City, was at the Trail smelter recently looking after a consignment of concentrates shipped from his mine. This shipment was of particular interest because it was the first product of a new adaptation of the flotation process to dry silver ores, and its success means low grade ores throughout the district, thus opening up a new vista in the treatment of dry silver ore. Seven hundred tons of mill feed of ore averaging twelve ounces to the ton were reduced to 20 tons of concentrates, containing 75 per cent of the total silver content. Mr. Biggar reports mining throughout the Slocan mining division is now more active than at any time in the past year. A number of other mines will soon begin shipping to the smelter and leaders throughout that section have taken fresh heart. Trail News.

At a meeting of the Association of Women of the Mining Industry held at Mrs. J. B. Tyrrell's residence, an address on Columbia, S. America, was given by Mrs. E. V. Neelands. The Association will hold several meetings during the winter months.

B.C. COAL MARKET DULL.

At the end of the month of October the coal production of the Province of British Columbia for 1921 aggregated about 80 per cent of the output for the same period last year. That the last two months of the year would see such an increase of activity at the collieries as to almost overcome the deficiency was the opinion of computators at that time. The situation now has changed, it being clear that the 1921 record can scarcely hope to equal that of the previous year.

On Vancouver Island two of the mines of one of the largest producers, the Canadian Western Fuel Corporation Ltd., Nanaimo, B.C., have been closed temporarily. These are the Wakesiah and Herewood Mines. At Extension, Nos. 1, 2 and 3 Mines, Canadian Collieries (D) Ltd. were compelled to close for about a fortnight owing to floods but are again in operation. Extension is responsible for a production of between 16,000 and 18,000 tons of coal per month. The Comox Mines of the same Company are working not much more than half time. The Cassidy Collieries, Granby Consolidated Mining & Smelting Co. Ltd., are maintaining a steady production of about 1,000 tons a day.

In the Nicola-Princeton Field the situation shows little change. The Coalmont Collieries Ltd. are making a better showing, ranking now next to the Middlesboro Collieries.

The Coal Creek, and Michel coal mines, Crow's Nest Pass Coal Co. Ltd., are working about five days a week on an average. A slight falling off is shown but, generally speaking, production is being maintained rather better in this section than on the coast.

Coal Mine Operators hesitate to ascribe a reason for the present dullness of the market. In some quarters the competition of fuel oil is blamed. There is significance in the fact that oil has dropped in some four months from $5.50 to $2.30 a barrel in Vancouver. Four barrels of oil are equal approximately to a ton of coal in B. T. U's or heat producing values. It follows that oil, equal in heating qualities to a ton of coal, can be purchased in Vancouver for $9.20. Coal cannot be produced at that figure. The cheapest it can be placed on a steamship in Vancouver is $10.50 a ton, this being Vancouver Island steaming coal. In view of these facts it seems reasonable to suppose that the present competition of oil is having a material effect on the demand for the locally produced fuel.

B.C. COAL OUTPUT, OCTOBER.

Vancouver Island District.

Mine	Tons
Canadian Western Fuel Co., Nanaimo	64,445
Canadian Collieries (D) Ltd.—	
Comox	35,440
South Wellington	8,600
Extension	18,619
Nanoose Wellington Collieries, Wellington	6,885
Granby Consolidated MS&P Co., Ltd., Cassidy	24,254
Old Wellington, (King & Foster)	513
Total	158,756

Nicola-Princeton District.

Middlesboro Collieries, Middlesboro	6,977
Fleming Coal Co., Merritt	3,499
Coalmont Collieries, Coalmont	6,045
Princeton Coal & Land Co., Princeton	2,616
Total	19,137

Crow's Nest Pass District.

Crow's Nest Pass Co.—	
Coal Creek	36,555
Michel	24,940
Corbin Coal & Coke Co., Corbin	5,789
Total	67,284
Total for the month	245,177.

PACIFIC COAST COAL MINES.

The affairs of the Pacific Coast Coal Mines, Ltd. appear to be in almost an inextricable tangle, both in point of litigation and finances. The Morden and Suquash Mines of the Company were offered separately by the Sheriff at Nanaimo City on November 1st. The former was bought in by that Official with a reserve bid of $250,000 and the Suquash Property was taken up also with the reserve bid, the figure being $200,000. No sale to outside parties having been effected the situation remains unchanged.

Meanwhile litigation in the local courts continues. Applications are under consideration for the reduction of these upset prices on behalf of a legal firm having a claim of $40,000 and the representatative of 550 coal miners, former employees of the company, who wish, by virtue of mechanics' liens secured against the holdings of the Company, to obtain arrears of wages. This is being opposed by judgment creditors among whom are the Canadian Bank of Commerce, the Prudential Trust Company et al, the amount involved being considerable over $2,000,000.

Notwithstanding the present apparent confusion there is a prospect that the matter will be settled at an early date.

PORTER GOLD MINES.

An outlay of $200,000 will be made on the development of the Porter Gold Mines this Winter, says a cable from Sault Ste. Marie to the Toronto Mail & Empire, following the excellent showing made in the sinking of the first shaft in the mine. Word received from Gondreau Township was to the effect that other properties were showing rich free gold ore similar to that of the Murphy-Porter claims. The Gutcher properties, with three veins, have, it is reported, shown up well. A Detriot syndicate has taken an option on the sixteen claims of Thomas Powell and others, at a considerable distance east of the Porter mines. The first shaft in the latter has been sunk six feet in four days, and continues to make an excellent showing. There is feverish activity throughout the whole township.

PERSONALS.

Mr. Kirby Thomas of New York is in Toronto on his way back from Gowganda where he visited the Northcliffe property at which development work is being carried on.

Mr. A. G. Burrows is putting the finishing touches on his revised report on the Gowganda silver area. This has been for some time in the hands of the printers and should soon be ready for distribution.

A meeting of the Toronto Branch of the Canadian Institute of Mining and Metallurgy will be held on Saturday, November 26th.

Mr. F. J. Bell has resigned as president and general manager of Canada Wire and Cable Co.

PLACER MINING IN B.C.

Most of British Columbia's placer gold production comes from the Atlin, Omineca, and Cariboo Districts and it is expected, although no official figures have been compiled as yet, that the output for 1921 will be about the same as that of last year. Thus it may be anticipated that the value of the gold so recovered throughout the Province in the twelvemonth drawing to a close will amount to approximately $221,600 in value.

There has been clear evidence of a renewal of interest in the placer fields of the Province. This is not confined to one particular section. It is true of the Cariboo, where the Provincial Government last Summer did some keystone drilling; of the Omineca, where a number of enterprises give promise of becoming established mining industries; of the Peace River, where an important dredging proposition has been launched; and of the Atlin District.

It is significant that within the past few weeks Mr. J. B. Tyrrell, a well-known mining engineer of Toronto Ont., has been visiting the Province. In well informed quarters it is said that Mr. Tyrrell's visit to the West was made on behalf of a considerable and substantial body of capitalists of the Old Country. They are reported to be interested in the development on a large scale of some of the placer grounds of the Cariboo, Keithley Creek being mentioned as being the part with which his principals are particularly concerned. If Mr. Tyrrell's report is favorable it is possible that an investment aggregating $2,000,000 will be made in the Province. As Mr. Tyrrell is an engineer of high repute and unquestioned ability, one who has been identified with mining in the Yukon in the days of the Klondyke rush and who since has been connected with mining in this Province and elsewhere in Canada, a member of the Canadian Institute of Mining & Metallurgy and known from end to end of the country to the other professionally, there can be no doubt that his work in the West was of importance and that the outcome will be awaited with interest.

While in the Atlin District proper there has been little placer mining development of a new character, work of consequence is in progress some distance further north on Thebert Creek in the vicinity if Dease Lake. Here George Adams, a well-known northerner, is busily working out the problem of hydraulicking a large area of ground that, without a doubt, carries good pay. In 1919 he recovered $14,000 as a result of two months actual work in a very small area. During 1920 and 1921 his efforts have been seriously handicapped because of slides which washed out his flumes in some instances and in others completely covered his pit, necessitating commencing all over again. Last reports are that the water system has been re-established in a satisfactory manner and that the ground has been so cleared as to permit of mining on such a scale as to permit of regular returns being secured. Mr. Adams is an old placer miner. He thoroughly understands hydraulicking, having been in the business in Atlin for a number of years, and the word that comes to the outside indicates that his perseverance is about to be liberally rewarded.

These instances of improvement in the placer mining situation, however, are not and will not be reflected in the statistical returns for 1921 but they are happy auguries for the future of the industry.

THOMAS CANTLEY'S CAREER.

The Maritime Mining Record, of Stellarton, N.S., has the following to say of Mr. Thomas Cantley, Government Candidate for Pictou:

Thos. Cantley is a striking example of what push, brains,—natural ability—can accomplish. In his early years he was a typical Nova Scotia boy, in that he could turn his hand to about anything, and not ashamed to tackle anything that came his way. The first work he did was as telegraph messenger boy in New Glasgow. Then he secured a position in the Drummond colliery office, Westville. The explosion put him out of a job. Nothing in his particular line turning up, he accepted a position with Fraser and McKay, who carried on a small business, chiefly in railway spikes, carriage springs and axles and later forging railway axles. Afterwards he held a position, for a few years, with McCurdy & Co. In the later seventies, he went into business on his own 'hook' the firm name being Thomas Cantley and Co. The firm dealt largely in building material, Mr. Cantley, by strict attention, and ability was building up a lucrative business, when he was approached by Mr. Graham Fraser and asked to become *traveller* for the Steel Company. A salesmen was necessary for the extended, extending business. Two salesmen had been employed prior to Mr. Cantley being called upon, but neither turned out a first class man, and that was the kind of a man wanted. They say that opportunity knocks but once at the door of a man. Thos. Cantley nearly lost his opportunity, for he, for a time, declined the position, having married two or three years previously, and being father of a little boy of the age when boys are most interesting, he naturally preferred home to being away on the road. Mr. Fraser would not have a refusal and Mr. Cantley finally consented to enter the service of the Steel Co., and from that time till the present his career is a record of promotion step by step, as Thomas Cantley's wonderful executive ability became more and more apparent. From the 'road' he went to the office, from the office to the Board Room, from the general directorate into the inner circle, until two or three years ago he became Chairman of "Scotia's" Board.

At the beginning of the great war when it was imagined that Nova Scotia could not produce munitions steel, he asserted she could, he was taken at his word and we all know the triumphant success attending munition manufacture in Canada, due in main part to the man who Pictou intends to send to Ottawa—Thomas Cantley.

COAL AND THE TARIFF.

A convincing argument in favor of protection, and even protection in this particular case higher than exists, is built up by the Nanaimo Herald in an article dealing with the coal industry. This industry on Vancouver Island has suffered during recent years from the competition of fuel oil. Had this competition been allowed to go on unchecked it would have very seriously interfered with a great local industry, and probably half the mines on the Island would have been forced to shut down. The Government, however, imposed a duty on imported fuel oil, and this had a steadying effect, but not altogether the most desirable effect, for a higher

tariff still would lead to immediate development of the coal industry and the opening up of new mines.

The Herald points out that British Columbia now imports from the United States fuel oil valued at $12,000,000 yearly. Owing to the adverse rate of exchange the people of this Province pay a premium of ten per cent or more on their money for the privilege of buying this fuel oil. A heavier tariff would lead to a wider use of coal, would mean a substantial increase to the wage roll on this Island and the consequent circulation of more money at home. Vancouver Island, because of its dependence on the coal industry, is practically interested in this tariff question, for there can hardly be a doubt that a reduction in the tariff, such as is advocated by both the Liberals and Farmers, would spell ruin to the development work which is being carried on in the coal areas. A stated case always carries conviction and there are sound and legitimate arguments why British Columbia should use products of its own mines for the benefits of its own people. The importation of fuel oil is on the increase and the coal industry suffers, which shows that the existing tariff is not high enough. It shows also that any reduction in that tariff would assuredly increase unemployment on Vancouver Island.—Victoria Colonist.

Northern Ontario Letter

THE SILVER MINES.

Temiskaming.

The possibility of the Temiskaming mine being worked under a leasing system is mooted this week in Cobalt mining circles. It is stated that this method of working the mine was discussed in official circles some time prior to closing down the mine, but was dropped on account of certain favorable developments having taken place about that time. It is now understood that a proposition is being prepared for presentation to the directors under which the mine might be worked on a royalty basis. As to this, there seems to be a strong element of doubt about the shareholders ratifying any such drastic steps in view of the fact that the resources of the mine, though limited, are such as will permit general operations to be conducted on at least a moderately profitable basis by the company itself. As long as this situation exists it is not believed the stockholders will be prepared to sanction the granting of leases to individuals.

Alladin-Cobalt.

Although the Alladin-Cobalt has suspended operations on the Chambers-Ferland mine, yet a small reduction of silver is being maintained through an arrangement whereby the adjoining Nipissing is working across the boundary of the Chambers-Ferland. This silver is being taken out on a basis of cost of mining and milling and has given general satisfaction on former occasions. Incidentally, the fact that such is being done has led to the belief that the Nipissing might reasonably be found making a bid for the purchase of the Chambers-Ferland.

Coniagas.

The re-treatment of tailings on the Coniagas has been suspended for the Winter due to cold weather interfering with outside operations of this nature.

Rich Ore at Nipissing Mine.

Official advice that vein No. 64 on the Nipissing mine has been opened up at an intermediate level and has been found to carry silver values of about $2,000 to the ton over a width of as high as 26 inches, mark the discovery as one of the best ever made in the Cobalt district.

Another feature of the discovery is that a large tonnage of good milling rock lies along the walls of the vein, and will yield about 100 ounces of silver to the ton.

This is the third important discovery to be made so far this year on the Nipissing, a fact which is giving rise to the belief that the new ore developed may actually exceed current production and thereby show an increase in reserves as of the end of the current year.

The latest ore shoot, running up to a width of 26 inches of $2,000 ore, is in a class with the surface bonanza's which in the early days of Cobalt earned the name of being silver sidewalks.

To Explore Bucke Properties.

Local mining men are endeavouring to organize a company which would have for its object the exploration of prospective silver mines in the township of Bucke. The re-survey of the geological structure of the Cobalt field is said to encourage the belief that commercial deposits of silver may be found in Bucke. The metal was found in a number of instances in this area, but was usually quite patchy and never resulted in more than intermittent operations on any of the various promising properties. In this latest effort under contemplation, a study of geology is to play a more important part than was the case in the past.

Keeley and Frontier.

Concurrent with the announcement that besides producing silver at the rate of over 100,000 ounces monthly the Keeley mine is adding in a big way to its ore reserves and is now stated to have approximately 850,000 ounces in sight, comes the information that the Haileybury Frontier is also meeting with substantial success. High grade has been found in a number of shoots on the Frontier, and although the occurrences are less spectacular than on the Keeley and not so large, yet they hold out good indications of further work resulting in the discovery of more extensive deposits.

La Rose.

The cave-in of rock on the original property of the La Rose Consolidated which caused the workings to flood has proved to be costly, and it is now understood that very little hope is entertained for being able to dewater the workings profitably. For this reason a considerable tonnage of low grade ore as well as a limited amount of high grade has probably been lost. The company is now confining its efforts to the development of its three other properties, namely the Violet, Princess and University.

THE GOLD MINES.

McIntyre Will Increase Mill Capacity.

The directors of the McIntyre-Porcupine Mines have decided to proceed immediately with the installation of equipment which will increase the capacity of the mill to fifty per cent. above its present rate. This information is official and promises to increase production to $3,000,000 annually as compared with around $2,000,000 a year heretofore.

This announcement comes at a time when the general

public had come to believe that mill enlargements on the McIntyre would be left in abeyance until next summer, and is a favorable surprise.

The present mill is treating approximately 550 tons of ore daily, while the new equipment will be a separate unit of an additional capacity of 250 tons daily in which the carbon bearing ores will be treated by special process, patents for which have been secured by the McIntyre in Canada and the United States. This means that the total capacity will be brought up to 800 tons daily, with a probable big increase in the amount of net profit. A feature of the announcement regarding the enlargement is that work commences immediately and that the new unit will be ready for full operation in March.

Another feature is that late yesterday the weather turned quite mild along the height of land and considerable rain fell. This caused a large amount of snow to melt and has caused a great volume of water to flow down into the lakes and rivers thereby adding to the water supply in storage for power development and completely setting at rest any fear in regard to power shortage for another full year.

The main shaft on the McIntyre has reached a depth of 1,875 feet at which point a station is being cut preparatory to opening up development levels at a depth of 1,625, 1,750 and 1,875 feet. In this way, the mine will be put in shape to feed still further enlarged mill at such time as additional power development becomes assured.

Union Mining Company.

Lateral work is being conducted at two levels on the property of the Union Mining Corporation, situated in the township of Whitesides and about thirty miles south-west of the producing section of the Porcupine field.

The shaft is down 300 feet, with lateral work having been carried on at a depth of 150 feet as well as at the 300-ft. level. It is now stated officially that arrangements will be made to conduct extensive diamond drilling operations for the purpose of exploring the veins at a still lower horizon.

R. W. Winton of Chicago, is president of the corporation, recently paid a visit to the property. C. Denker is engineer and manager in direct charge of operations.

Night Hawk Lake.

The Night Hawk Lake section of the Porcupine mining division is attracting more or less attention. A force of about 25 men is employed on the Peninsular Gold Mines, where A. R. Globe, former assistant manager of the Hollinger is in charge of operations.

Other properties in the Night Hawk Lake district are the Triplex to the south-west, the Muir property to the south-east and the Carveth to the east. It is stated by interested mining men that the coming summer may witness widespread activity in this field.

May Re-Open Ankerite.

The Ankerite property in the township of Deloro may be re-opened some time during the coming month provided the plans of Clifford E. Smith materialize. The property was aggressively operated some years ago by the Coniagas Mines of Cobalt, but values were officially stated to be too low to make the veins of commercial value. A large amount was paid and a further substantial amount spent on the property, but the Coniagas relinquished its option in preference to meeting the final payments.

At the same time, the Coniagas purchased the adjoining Maidens-McDonald property for something like $18,000 which property it still holds. The veins are said to traverse both properties.

Hollinger Treats 3,880 Tons Daily.

During the four weeks ended Nov. 4th the Hollinger Consolidated mill treated an average of 3,880 tons of ore daily This compares with an average of 3,858 tons daily during the preceding four weeks.

This latest achievement is the greatest ever accomplished at the Hollinger and marks almost the maximum that may be expected with the present milling equipment. Further increases will probably take place in due course through the installation of ball mills.

Ontario Gold Mines Output.

The Cobalt correspondent of the Journal corrects an error which recently crept into one of his articles about the present standing of the gold mines of Northern Ontario in which it was stated that an aggregate of upwards of two million tons of ore were being treated "daily". This should have read "annually."

Exploring North of Cochrane.

Right at the heels of the official statement just issued by George W. Lee, chairman of the T. and N. O. Railway Commission, that preliminary work in connection with the extension of the line from Cochrane to Oil Can Portage is now under way comes the information that a large number of boring permits are being applied for in that area lying approximately 40 miles beyond the end of the railway extension.

Geologists, among them being M. Y. Williams of the Geological Survey, Ottawa, have previously visited the district and report the occurrence of oil shales under conditions which hold out promise of petroleum being ultimately found in commercial quantities. These shales occur on the Mattagami river, and the applications for boring permits include territory on both sides of the Mattagami.

In a number of applications brought in to the Mining Recorder's office at Haileybury, were a number for land lying to the west of the Mattagami River. Prospectors are reminded that the river at this point constitutes the dividing line between the Temiskaming and the Sudbury Mining Divisions and that all applications for boring permits along the west side of Mattagami must be submitted to the Mining Recorder at Sudbury.

The announcement that the construction of the T. and N. O. extension is to proceed at once has signalized a general movement among prospectors to push far out into the unexplored lands ahead of the railway so as to "stand on the ground floor" at such time as the line is completed. There are thousands of square miles of territory through which no railways, not even a survey line passes and the area lies as a huge prize package into which the hunters of natural wealth are now finding their way.

King Kirkland.

A special general meeting of the King Kirkland Gold Mines, Ltd., will be held in Toronto, Nov. 28, for the purpose of considering and, if approved, confirming certain by-laws passed by the directors.

These by-laws are three in number, being summarized as follows:

(1) A by-law authorizing an application to the Lieutenant Governor for the right to increase the company's capitalization from 2,500,000 shares to 5,000,000 shares.

(2) A by-law authorizing the sale of the new stock at a discount.

(3) A by-law authorizing the purchase by the company from C. F. Jordan, E. L. Wettlaufer, G. A. M. Davison, Geo. Wettlaufer, A. B. Crosby, Gea. I. Hambly and Herbert Spoffard of the "Ferguson" claims Nos. 12440 and 12441 in the Larder Lake mining division. The price to be paid is 450,000 shares.

The Ferguson claims comprise approximately 80 acres and lie immediately adjacent to the present holdings of the King-Kirkland. In addition to having big prospective merit from a mineral standpoint, they are believed to comprise an excellent townsite.

The present authorized capital of the King-Kirkland is 2,500,000 shares, of which there are 970,000 shares in the treasury. By increasing the capitalization to 5,000,000 shares, issuing share for share of that already issued and paying 450,000 shares for the Ferguson claims, the King Kirkland property will be greatly increased in size and the treasury will contain 3,020,000 shares. With such a treasury and having a property of excellent merit, the King-Kirkland appears to be working into a position where no difficulty should be encountered in financing development work on a big scale and providing money for mill construction at such time as such equipment may be required.

Lake Shore.

During the month of October the Lake Shore mine produced $51,302.88. The mill operated 97.98 per cent of the possible running time and handled 2,015 tons of ore. This is the highest tonnage record in the history of the mine.

The Lawson Rumor.

All the flurry which developed in connection with reports that Thomas W. Lawson would visit the Kirkland district with a view toward interesting himself in a number of properties, appears to have died with the dismissal of a court case against "Col." Macklem who was represented as an advance agent of Lawson's.

Macklem entered into negotiations with B. C. Killoran of Haileybury for the purchase of three claims in Teck Township, the price to be $6,500. It was represented by him that he was a member of a syndicate in New York which had a capitalization of $50,000, his subscription to which was to be $2,500. Macklem stated that he had $2,000 but required $500 more to make good his membership in the syndicate, and if able to secure this $500 would then be in a position to go ahead with the $6,500 deal. It was suggested that a note should be drawn up for $500, backed by B. G. and H. Killoran. At the same time, Macklem presented the Killorans with a cheque for $7,000, this being payment for the claims as well as covering the note. Accordingly, when the time arrived for cashing the cheque as agreed, no funds were there. A charge of fraud was then entered against Macklem.

During the course of taking evidence, it developed that Macklem had already paid the Killorans $90 on the note, and the case was dismissed on the grounds that there was no evidence of fraud. In the meantime, nothing has been learned of "Lawson's second coming."

The bi-Metallic Standard.

Senator Tasker L. Oddie of Nevada has gone on record as declaring that the world must adopt a bi-metallic standard if the monetary status of the nations is to be preserved. It is stated that one of the leading economists who attended the recent meeting of the American Mining Congress in Chicago was asked the question of how could the countries of the world expect to meet their debts? To which he replied that the payment would be impossible unless the production of gold was stimulated far beyond its present rate. This stimulation does not appear to be possible, and in order to protect the present monetary system it would be imperative for the nations of the world to adopt the bi-metallic standard.

Whether or not Senator Oddie, or whether the economist referred to have judged the situation correctly is problematical. Silver producers have the fact fresh in mind that when the price of silver went to $1.37 cents an ounce a couple of years ago, there were a number of alleged metal authorities who predicted $2.00 silver. This has a tendency to make producers of the present day extremely cautious in accepting expressions of opinion.

One thing is sure, of course, and that is should bi-metallism be adopted on a basis of 16 to 1, that is 16 ounces of silver for 1 of gold, the silver mines in the Cobalt district would experience another boom. In thus fixing the price of the metal at $1.29 cents an ounce as compared with under 70 cents an ounce at the time of writing, an enormous tonnage of what is at present waste rock would be changed into a big profitable resource.

There would probably be at least a dozen new silver producers added to those that are already producing, while the incentive to explore and develop silver prospects would become great.—J. M.

B.C. MINING NOTES.

Stewart, B.C.—The boom days in the Portland Canal District, northern British Columbia, have passed and in their place has come a spirit of confidence coupled with solid development. Much has been said of the Premier Mine, but miners claim that the possibilities of the property are not yet appreciated on the outside, it not being confidently asserted that with the completion of the aerial tramway under construction, and the finishing of other work at the mine and at tidewater, the Company will be in a position to proceed with the opening up of one of the biggest mining propositions on the continent. George Clothier, the resident mining engineer for the District, is expected to have considerable to say in his Annual Report, not only regarding the Premier but with respect to other promising properties and to mining conditions generally in that section. Some of the prospects in the Fish Creek zone are said to be looking particularly well and development work is to continue throughout the winter on the property of the Fish Creek Mining Co. The Silverado Group of Mineral Claims also are being systematically explored.

Trail, B. C.—Ore receipts at the smelter of the Canadian Consolidated Mining & Smelting Company, Trail, for the week ending 31st October totalled 11,307 tons. Among the contributories were the Horn Silver, Silkameen, 43 tons; the Jessie Bluebird, Woodberry, 21; the Josie, Rossland, 96; the Molly Hughes, New Denver, 27.

the Ottawa, Slocan City, 26; the Queen Bess, Alamo, 33; and the Rambler, 32. The remainder 11,023 tons came from the company mines. The aggregate for the year runs to 348,156 tons.

Nelson, B.C.—The North Star Mine, Kimberley, has been re-opened after a period of idleness extending from last January. O. C. Thompson, one of the owners, states that it is the intention to operate throughout the winter. The North Star has only shipped a few cars this year, these consisting of a clean-up of old ore. In 1919 and 1920 this Mine was one of the chief private shippers in the Kootenay in point of tonnage. Mr. Thompson is interested with W. B. Horton in the Utica Mine, held by them under lease, and in the deepest workings two ore shoots have been uncovered recently, one 18 inches and the other about 24 inches in width, the showings being of clean ore of shipping quality. They now are driving a 2,000 foot crosscut which will give an additional depth of 250 feet on the vein.—L. H. Biggar, manager of the Ottawa Mining & Smelting Co., whose property is situated on Springer Creek, five miles east of Slocan City, has made a shipment of concentrates from the Ottawa Mill to the Trail Smelter. The shipment is of special interest because it is the first product of a new adaptation of the flotation process to the dry silver ores of the district. Mr. Biggar states that 700 tons of mill feed of ore averaging 12 ounces to the ton was reduced to 20 tons of concentrates, containing 75 per cent of the total silver contents and that the total cost of milling and handling was only $2 a ton from the dump to the smelter. As the values are concentrated to one-thirty-fifth of the original bulk the saving in freight alone is material and the Ottawa Mill Process may well be considered to mark a notable advance in the economic treatment of the dry silver ores of the section. Mr. Biggar and his associates have a four year lease of the Ottawa Mine and enough ore is in sight, it is said, to keep the Mill in operation for that period. It is the intention, however, to extend the plant in order to permit of the treatment of ore from neighboring properties. — The Mine Operators Association of Eastern British Columbia has been organized at Nelson, officers being elected as follows: President, R. Randolph Bruce, Invermere; vice president, Clarence Cunningham, Alamo; secretary-treasurer, W. H. Burgess, Kaslo; executive, S. S. Fowler, Riondel; T. W. Bingay, Trail; Major A. W. Davies, Nelson; J. P. McFadden, New Denver; W. T. McDowell, Ymir; Douglas Lay, Rossland; and S. G. Blaylock, Trail. Mining taxation is the principal subject with which the new organization is concerned at present, it being maintained that owing to the low prices obtainable for metals, as well as to general conditions, there should be no further taxation of the industry.

Vancouver, B.C.—J. B. Tyrrell, mining engineer and geologist of Toronto, Ont., addressed a recent meeting of the Vancouver Branch of the Canadian Institute of Mining and Metallurgy. He referred to the magnificent natural resources of British Columbia in agriculture, minerals and timber and continuing said: "There are people in Vancouver who would put their money into development projects if they believed the money would be properly expended. When it comes to mining the people do not know where to go for good advice. You as mining engineers can give them such advice and it is your duty to tell the people where they can be advised. You talk among yourselves and write articles to the technical magazines which are not read by the general public. If the public can be assured of fair and competent service it will be prepared to furnish funds for the service rendered. The province must look to you mining engineers to develop the resources of the province. You must get information about the mineral industry into the daily newspapers which are read by the public. You must get the ear of the public and assert yourselves in your profession in the duty of developing the resources of the country."

The Annual General Meeting of the British Columbia Division of the Canadian Institute of Mining and Metallurgy will be held in the City of Vancouver sometime during the month of February. In a circular announcing this decision the secretary emphasizes the opportunity that is afforded by such a gathering for the mining men of the Province to get together, at least once in the year, "to renew old acquaintances and make new ones." It also is stated that an excellent programme is being prepared and the hope is expressed that all members will make a point of planning to be present.

Dawson, Y. T. — Development work is to continue all winter on a number of the Mayo Camp properties. Electric drills are to be used throughout the closed season on the properties of the Yukon Gold Company and the Bradley Interests, associated with the Alaska Treadwell Company, will continue prospecting at their new camp, Keno Hill. Two shafts, three hundred feet deep, are to be sunk and connected on four levels. The Yukon Gold Company is opening up a vein of galena. It is a high grade ore, said to average well above 200 ounces of silver to the ton. Sixty additional claims have been staked within a month on Galena Hill, where recent promising strikes are reported. The winter work of hauling ore from Keno Hill to Mayo Landing for summer shipment down the river is now under way.

TECK-HUGHES.

Mr. Charles L. Denison, of New York City, the president of the Teck-Hughes Gold Mines, Limited, has written to the Financial Editor of the Toronto Mail and Empire to say that the long-awaited meeting of that organization has been set for November 30, when, it is expected a definite proposition will be placed before the shareholders. In some quarters there has been a disposition to blame the management for the delay in calling the shareholders together, but Mr. Denison says that, after the Provincial Government had submitted a draft of the title to the property that was satisfactory to the company's attorneys, the death of the late Lieut.-Governor Clarke before his signature had been attached necessitated the matter being gone over again. "I am sorry that the affair could not have been closed up before," says Mr. Denison. The forthcoming meeting is to be held in Toronto, although Mr. Denison and a majority of the bondholders wanted it held in New York. In deference to the stockholders this city was selected. Mr. Denison will probably not be able to be present, as his health has not been very good of late. While the plan that is to be submitted to the shareholders has not been as yet officially disclosed, it is understood that it will involve a new issue of stock and the retirement of at least a portion of the existing bond issue. Meanwhile the company is understood to be producing gold at a rate second only to the Lake Shore and the Wright Hargraves in the Kirkland Lake region.

TORONTO MINING QUOTATIONS.

Quotations or Active Stocks on Standard Stock Exchange, Toronto, on 22nd November, 1921.

	High	Low	Last
Silver			
Adanac Silver Mines, Ltd...	1⅜	1¼	1⅜
Beaver Consolidated	20	19	20
Coniagas	1.20	1.20	1.20
Gifford	⅜	⅜	⅜
Hargraves	⅝	⅝	⅝
La Rose	33½	32	32
Mining Corp. of Can.	1.15	1.05	1.15
Nipissing	6.70	5.75	6.55
Ophir	⅞	¾	¾
Peterson Lake	5½	5	5¼
Silver Leaf	½	½	½
Temiskaming	25	25	25
Trethewey	12½	11½	12½
Gold			
Atlas	15	15	15
Dome Extension	76	76	76
Dome Lake	8	6¾	8
Dome Mines	22.50	20.00	21.25
Gold Reef	1¾	1⅝	1⅝
Hollinger Cons.*	7.96	7.55	7.88
Keora	10	9⅞	10
Kirkland Lake	31	28	31
Lake Shore M. Ltd.	1.23	1.19	1.22
McIntyre	1.95	1.91	1.92
Moneta	8½	7¾	7⅞
Newray Mines, Ltd.	5	5	5
Porcupine Crown	14¾	14	14
Porcupine V.N.T.	18	17	17
Preston East Dome	2¾	2½	2¾
Schumacher	25	23½	24
Teck-Hughes	16	15	15¾
Thompson Krist	2	2	2
West Dome	7	5½	5½
West Tree Mines Ltd.	3½	3½	3½
Wasapika Gold Mine Ltd...	5	4⅛	4¼
Miscellaneous			
Petrol Oil	20	20	20
RRockwood Oil, Gas	½	½	½

* XD

METAL QUOTATIONS.

Following are the fair average price for ingot metals (in less than car-loads):

Toronto.	Cents per lb. 22nd Nov. (Unchanged since last week).
Copper, Electric	17
Copper, Casting	16¾
Tin	35
Lead	6¾
Zinc	7½
Aluminum	27
Antimony	9

U.S. COAL PRODUCTION.

Observance of Armistice Day was the principal cause of a sharp drop in total production of coal during the week ended November 12. The output of bituminous, including lignite and coal coked, is estimated at 8,466,000 net tons, as against 9,315,000 the week before and 10,956,000 in the last week of October.

THE VALUE OF GOLD.

To the Editor of *The Canadian Mining Journal*:

Sir,—I have read with interest some of the articles by Alexander Gray on "Gold" appearing in the "Canadian Mining Journal" and "Wall Street Magazine" and take the liberty of addressing you in reference thereto. I am of the opinion that "Gold" is the one factor that will decide either the prosperity or destitution of the present world, and am pleased to learn of some one else in Canada being interested in this question. I have written some letters to a Vancouver paper on this subject and enclose a copy of one, but the people of this country, generally, are blind on the money question, although it means bread and butter to many.

You, no doubt, have noticed the claims made by financial writers, "that the price of commodities determines the value and purchasing power of gold." You quote a Mr. Evans who seems to reason along similar lines. I cannot agree with that view, as it would be setting up commodities as a standard by which the value and purchasing power of gold might be determined, while the reverse is the case. I will adduce some proofs in support of my contention—if you are interested, consider them, if not throw the letter in the waste.

The standard price of gold in dollars is $20.67 per oz. The different monetary units contain sufficient gold to conform to this price. The unit of value is determined by decree insofar as the standard weight and fineness is concerned, but the value thereof is a different matter, and is subject to a higher law, that of "production and use" and value cannot be legislated into a thing that does not proceed by direct methods. Consequently, the value of gold would not be directly affected if the price were placed at $40 per oz., unless its use was increased or lessened thereby.

As an illustration, in respect to the value and purchasing power of gold, we can use the standard silver dollar, as when measured by gold we can observe the rise and fall of value therein, as with the purchasing power. Some time ago the price of silver rose to $1.30 per oz. (gold), the silver dollar then being at par with gold. Later it dropped to 60 cts. per oz., the value of the dollar going below 50 cts. (gold). Yet no change took place in the appearance, weight, etc. of that dollar, value being the only feature affected, which shows that "value" is the main requisite of a standard irrespective of the amount of metal it contains. It is easy to see that the actual worth of that dollar depended upon the value of the metal of which it is composed, and that the purchasing power increases or decreases according as the value thereof does—without reference whatever to the price of commodities, which must be changed to conform to the value of the standard, and may or may not be a true index to the purchasing power thereof. The gold dollar being subject to the same law in respect to value and purchasing power. As an instance—if gold should become as plentiful as silver, costing no more to produce, other things being equal, its value would be no greater. If it still remained the standard, its price, weight, fineness, etc., would be as today, but its value would be much different.

We can see today the price of all dairy products, eggs, etc., advancing, while that of cereals is decreasing, which according to this theory would mean both an increase and decrease in the purchasing power of mon-

The Canadian Miners' Buying Directory.

Acetylene Gas:
Canada Carbide Company, Ltd.
Prest-O-Lite Co. of Canada, Ltd.

Acetylene Welding:
The Toronto Iron Works, Ltd.

A.C. Units:
Powley & Townsley, Limited.

Agitators:
The Dorr Co.
Can. Chicago Bridge & Iron Co., Ltd.
Horton Steel Works, Limited.

Air Compressors:
Belliss & Morcom, Ltd.
Laurie & Lamb

Air Hoists:
Canadian Ingersoll-Rand Co., Ltd.
Mussens, Limited.

Air Receivers:
The Toronto Iron Works, Ltd.

Alloy and Carbon Tool Steel:
Peacock Brothers Limited.

Alternators:
MacGovern & Co.

Aluminium:
Spielman Agencies, Regd.

Amalgamators:
Northern Canada Supply Co.
Mine and Smelter Supply Co.
Wabi Iron Works.

Antimony:
Canada Metal Co.

Antimonial Lead:
Pennsylvania Smelting Co.

Assayers' and Chemists' Supplies:
Dominion Engineering & Inspection Co.
Lymans, Limited
Mine & Smelter Supply Co.
Pennsylvania Smelting Co.
Stanley, W. F. & Co., Ltd.

Ash Conveyors:
Canadian Link-Belt Company

Ashes Handling Machinery:
Canadian Link-Belt Co., Ltd.

Assayers and Chemists:
Milton L. Hersey Co., Ltd.
Campbell & Deyell
Ledoux & Co.
Thos. Heys & Son
C. L. Constant Co.

Asbestos:
Everitt & Co.

Balls:
Hull Iron & Steel Foundries, Ltd
Peacock Brothers Limited.
The Wabi Iron Works.
The Hardinge Conical Mill Co
The William Kennedy & Sons, Ltd.

Ball Mills:
Hardinge Conical Mill Co.
Hull Iron & Steel Foundries, Ltd
The Wabi Iron Works.
The William Kennedy & Sons, Ltd.

Babbit Metals:
Canada Metal Co.
Hoyt Metal Co.

Ball Mill Feeders:
Hardinge Conical Mill Co.
Hull Iron & Steel Foundries, Ltd

Ball Mill Linings:
Hardinge Conical Mill Co.
The William Kennedy & Sons, Ltd.
Peacock Brothers, Limited
Hull Iron & Steel Foundries, Ltd.

Belting—Leather, Rubber and Cotton:
Canadian Link-Belt Co., Ltd.
The Mine & Smelter Supply Co.
Northern Canada Supply Co.
Jones & Glasco.

Belting:
R. T. Gilman & Co.
Gutta Percha & Rubber, Ltd.

Belting—Silent Chain:
Canadian Link-Belt Co., Ltd.
Hans Renold of Canada, Limited, Montreal
Jones & Glassco (Regd.)

Belting (Transmission):
Goodyear Tire & Rubber Co

Belting (Elevator):
Goodyear Tire & Rubber Co

Belting (Conveyor):
Goodyear Tire & Rubber Co.
Gutta Percha & Rubber, Ltd.

Bins and Hoppers:
The Toronto Iron Works, Ltd.
Can. Chicago Bridge & Iron Co., Ltd.
Horton Steel Works, Limited.

Blasting Batteries and Supplies:
Canadian Ingersoll-Rand Co., Ltd
Mussens, Ltd.
Canadian Explosives, Ltd.
Powley & Townsley, Limited.

Bluestone:
The Consolidated Mining & Smelting Co
The Coniagas Reduction Co., Ltd.

Blowers:
Canadian Fairbanks-Morse Co., Ltd.
Northern Canada Supply Co.

Boilers:
Canadian Ingersoll-Rand Co., Ltd.
Marsh Engineering Works
R. T. Gilman & Co.
The John Inglis Company
Wabi Iron Works.

Blue Vitriol (Coniagas Red):
Canadian Fairbanks-Morse Co., Ltd.

Bortz and Carbons:
Diamond Drill Carbon Co.

Boxes, Cable Junction:
Standard Underground Cable Co. of Canada, Ltd.
Northern Electric Co., Ltd.

Brazilian Rough Diamonds:
Diamond Drill Carbon Co.

Brazilian Mica:
Diamond Drill Carbon Co.

Buggies, Mine Car (Steel)
Hendrick Manufacturing Co.

Brazilian Ballas:
Diamond Drill Carbon Co.

Brazilian Rock Crystal:
Diamond Drill Carbon Co.

Brazilian Tourmalines:
Diamond Drill Carbon Co

Brazilian Aquamarines:
Diamond Drill Carbon Co.

Bridges—Man Trolley and Rope Operated—Material Handling
Canadian Mead-Morrison Co., Limited

Bronze, Manganese, Perforated and Plain:
Hendrick Manufacturing Co.

Buckets:
Canadian Ingersoll-Rand Co., Ltd.
R. T. Gilman & Co.
Hendrick Manufacturing Co.
Canadian Link-Belt Co., Ltd.
Marsh Engineering Works
Mussens, Ltd.
MacKinnon Steel Co., Ltd
Northern Canada Supply Co.
The Wabi Iron Works

Buckets, Elevator:
Canadian Link-Belt Co., Ltd.
Hendrick Mfg. Co.
Peacock Brothers Limited.

Cable—Aerial and Underground:
Canada Wire & Cable Co.
Northern Canada Supply Co.
Standard Underground Cable Co. of Canada, Ltd.
Peacock Brothers, Limited

Cableways:
Canadian Mead-Morrison Co., Limited
Fraser & Chalmers of Canada, Ltd.
Mussens, Ltd.
The Wabi Iron Works
R. T. Gilman & Co.

Cages:
Canadian Ingersoll-Rand Co., Ltd., Montreal, Que
Northern Canada Supply Co.
Fraser & Chalmers of Canada, Ltd.
The Electric Steel & Metals Co.
The Mine & Smelter Supply Co.
Mussens, Ltd.
The Wabi Iron Works

ey, at the same time. The price of many products is controlled absolutely through understandings amongst producers, due to protection from world competition by an artificial barrier known as a high tariff, regulated on a currency basis. While the basic commodities, such as many of farm, forest and mineral products, must compete on world markets, the price of which is measured by highly appreciated gold dollars wherein the producer has no control over the price, which is as a consequence being forced down.

We hear of the decreased value and purchasing power of gold chiefly through editors of papers. It would be interesting to know what brought it about? Special payments were suspended for the purpose of protecting gold reserves. Gold is in greater need today than at any time before for the purpose of reserves in support of the paper issues of the various countries (without which, notes payable in gold, and in gold standard countries if not payable in such are worthless, as it requires no effort to produce millions of dollars worth, and have no value if the promise cannot be redeemed) the visible supply not being able to meet the demand. The greatly increased cost of production applied to gold as well as all commodities, and if these features cause gold to depreciate in value, it is in direct contravention of all economic laws. The gold standard was nowhere abandoned, and if it had been all currency based on payments in gold would become worthless. All countries, United States excepted, are functioning on a currency basis, but gold measures the value of those currencies, the result is the same the world over, the standard of measurement being the same. The concentration of gold in the United States does not cause inflation of prices there, and cannot anywhere unless it should decrease in value. If it did, then it should apply to commodities such as copper, wheat, paper and other products that are not controlled in price by artificial methods as there is evidently more gold there now than before.

If there was a shortage of wheat in the world, and the bulk was accumulated in one country, this fact would not cheapen the price even where it was piled up, as the world's demand for such would force it up everywhere, and to a greater extent than if it was equally distributed, and the position of gold is identical. The United States has the dearest money in the world today, and as a consequence the cost of production is higher,

D. J. Sullivan, Anyox, B.C.

COAL PRODUCTION IN U.S.

Production of soft coal in the United States showed a decided improvement during the week ended September 17, and for the first time since early in June, passed the eight-million ton mark. The total output, including lignite, coal coked at the mine, and mine fuel, is estimated at 8,139,000 net tons. In comparison with the week ended September 3, the most recent week of full time production, this was an increase of 533,000 tons, or slightly over 7 per cent. So far as it has gone, the year 1921 is in round numbers 47,000,000 tons behind 1919, 97,000,000 tons behind 1920, and about 126,000,000 tons behind the average of the war years. Compared with the average of all four years, it is 99,000,000 tons behind. In considering the possible effect of this subnormal production it must be remembered that the consumption of bituminous coal varies greatly with the general condition of business. For example, in 1914, a year of industrial depression, domestic consumption was only 409,000,000 tons; in the war year, 1918, when industry was running at a maximum, it was 530,000,000 tons. In 1914 a production of 423,000,000 tons was sufficient to fill the needs of the country. At present, however, 1921 is behind 1914, and if production during the remainder of the year is maintained at the rate since January 1, the total output for 1921 will be only 393,000,000 tons. The most recent year in which less than 400,000,000 tons would have been sufficient was 1909.

UNEMPLOYED COAL MINERS.

Unemployment among coal miners will constitute one of the major subjects of discussion at the forthcoming conference which will meet in Washington in response to a call by Herbert Hoover, Secretary of Commerce. Unemployment at coal mines during the first eight months of 1921 set a new low record. It was even greater than during the period following the panic of 1893, which previously held the low record. Twenty-six per cent less work was performed in coal mines during the first eight months of 1921 than during the corresponding period of 1920. Enough information already has been gathered, in anticipation of the conference, to indicate that approximately 150,000 men who are coal miners by trade are not now engaged in that activity.

SINTERING FLUE DUST.

Working from preliminary designs of the Cambria Steel Co., Arthur G. McKee & Co., Cleveland, have designed and erected a complete sintering plant at Johnstown, Pa., for the sintering of flue dust, both the large stock on hand and that as produced. The plant embodies two of the large size Dwight & Lloyd sintering machines. Only 12 workmen are needed to handle over 1000 tons of material daily. The plant covers an area, 80 x 300 ft. Advantage is taken of a hillside location to eliminate the installation of an expensive trestle. An area of otherwise useless space is also occupied to advantage.

NITRATE POOL.

Those interested in the nitrate industry, says The Capitalist of London, (Eng.), will read with interest the telegram which has been received from the Valparaiso branch of the Anglo-South American Bank, in the course of which it is stated that there is no movement to report as regards nitrate, but the arrival of the Hon. Herbert Gibbs, chairman of the Nitrate Pool, is awaited with interest, in view of the possibility of an arrangement between the Association and the Pool. Mr. Gibbs, who is due in Valparaiso on the 29th inst., is visiting this country by invitation of the Chilean Government, and it is hoped that as a result of the personal conferences between the leading representatives of the nitrate interests which will then be possible, some arrangement will be evolved which will be satisfactory to all sections of the industry, and to Chile, to whose interests the present deadlock is obviously inimical.

EDITORIAL

THE GENERAL ELECTION.

With polling to take place on Tuesday next, the long-drawn-out election campaign is getting very near its end. It is more than usually difficult to make any forecast of the probable result of this election by reason of two circumstances. First, in the present contest, three distinct and separate parties are, for the first time in Canadian political history, contending, throughout the length and breadth of the Dominion, for place and power. Secondly, this contest is the first in which the women of the whole country have been entitled to the exercise of the franchise. These two circumstances combine to introduce an element of doubt—just as they present unusual possibilities—into the present election which is remarkable even in this country where the political opinion of the constituencies is notoriously difficult to collect, save at the polls themselves.

Apart from the question of the Government record which, in various directions, has been bitterly assailed by both the Liberals and the Progressives, the question of the tariff has formed the dominant issue in the campaign which is now so near its end. Three weeks ago, we dealt editorially, at some little length, with this important question, as we believe it to be viewed by the mining industry as a whole. In our judgment, mine operators generally would welcome the duty-free importation of such mining machinery and parts as are not manufactured in this country, but, at the same time, they are very far from being inclined to be unduly and selfishly insistent on the encouragement of the mining operating industry at the expense of manufacturing industries already established and endeavoring, often under substantial handicaps, to serve the community well.

Considered purely as an intellectual problem, the framing of an adequate and equitable tariff for the Dominion—such a tariff as will mete out substantial justice to all the parties affected by its incidence, producer, manufacturer and consumer alike—is a feat the achievement of which surely presents no insuperable difficulty. It is a task which we should contemplate with equanimity seeing entrusted to the hands of either a Conservative or a Liberal Government. The one party stands for tariff for protection of industries, and the other for tariff mainly for purposes of revenue. But (as our past political history has shown) a tariff framed along lines substantially similar has hitherto satisfied alike the Conservative, Protectionist and Liberal who adheres to the tariff mainly for purposes of revenue. In other words, the difference between the two schools has been rather academical and theoretical than one involving any enormous divergence in practice. As it has been in the past, so we believe it is likely to be in the future, so far as Conservatives and Liberals are concerned.

But Conservatives and Liberals are no longer the sole contestants for the position of shaping the policy of the country, fiscal and otherwise. A new party—the Progressive party—has arisen whose goal, in the words of its accredited leader, the Hon. T. A. Crerar, is "the ultimate elimination of the principle of protection in our fiscal policy." The platform of this party demands that the tariff laws should be amended in the following respects:

(a) By an immediate and substantial all-round reduction of the customs tariff.

(b) By reducing the customs duty on goods imported from Great Britain to one-half the rates charged under the general tariff, and that further gradual, uniform reductions be made in the remaining tariff on British imports that will ensure complete Free Trade between Great Britain and Canada in five years.

(c) By endeavoring to secure unrestricted reciprocal trade in natural products with the United States along the lines of the reciprocity agreement of 1911.

(d) By placing all foodstuffs on the free list.

(e) That agricultural implements, farm and household machinery, vehicles, fertilizers, coal, lumber, cement, gasoline, illuminating fuel, and lubricating oils be placed on the free list, and that all raw materials and machinery used in their manufacture also be placed on the free list

(f) That all tariff concessions granted to other countries be immediately extended to Great Britain.

(g) That all corporations engaged in the manufacture of products protected by the customs tariff be obliged to publish annually comprehensive and accurate statements of their earnings.

(h) That every claim for tariff protection by any industry should be heard publicly before a special committee of parliament.

Now if this party should secure the opportunity, either alone or by reason of an undue predominance in a coalition it might effect with another party, to translate its platform into legislation, we confess we should regard the outlook with considerable apprehension. It may, no doubt, be said, and with a certain modicum of truth, that, in certain directions, some of the provisions quoted would directly benefit the mining operating industry. It may also, perhaps, be argued that, inasmuch as their conjoint tendency would undoubtedly be to direct workers from the factories of the country into its fields, its forests and its mines, the mining operating operating industry would indirectly benefit from them in the way of securing a more plentiful, and a much cheaper, supply of labor for the mines. But those engaged in the mining operating industry do not, we are persuaded; form their judgment solely by reference to any such narrow or sectional standards. Industrially, we "are members one of another," in a very real sense. From even the most casual and cursory examination of the platform from which we have quoted, and its almost certain effects in application, it is apparent that it seriously threatens many existing Canadian industries. As a matter of fact, it is not possible truthfully to say that, while such and such industries would be prejudicially affected by it, others would be unharmed thereby, and hence have no cause to be disquieted thereat. For if a blow is dealt at some industries, it is out of the question, in the complex and complicated condition of our present commercial and industrial life, that the effects of the blow should be confined solely to those particular industries. Impairment of a number of the country's industrial units must inevitably make for the impairment of our whole industrial fabric.

A reduction of the customs duty on goods imported from Great Britain to one-half the rates charged under the general tariff—apart even from the effects to be apprehended from "an immediate and substantial all-round reduction of the customs tariff"—would gravely menace the existence of hundreds of Canadian industries, "while complete Free Trade between Great Britain and Canada in five years" would completely and irretrievably ruin them. Even as things are today, a large number of our national industries are subjected to the pressure of acute and increasing competition from the importation of goods imported from Great Britain which not only enjoy the lower rates accorded by the existing British Preference, but are also, at the moment, substantially aided by the exchange situation.

Considerations of space prevent us from analysing the whole of the rest of the Progressive platform, but attention should be drawn to the plank which advocates "endeavoring to secure unrestricted reciprocal trade in natural products with the United States along the lines of the reciprocity agreement in 1911." Now, whatever may be said for, or against, the reciprocity agreement of 1911, the situation has certainly changed since then, and it scarcely seems opportune that, at a time when the United States has raised its tariff barriers to an almost prohibitive level, that we should indulge in extensive talk as to the feasibility of lowering our own. The Emergency Tariff Act of the United States had for its primary object the protection of the agriculture of that country from Canadian competition. If, in the future, it should be so modified as to allow of importation from Canada of agricultural products, the *quid pro quo* which would be insisted on would undoubtedly be heavy reductions in the Canadian tariff on manufactured goods from the United States. Thus, however it may be sought to disguise it, the demand for "unrestricted reciprocal trade in natural products with the United States" must mean the obtaining of special concessions by a special class—namely, the agricultural (and mainly the grain growing) class—in Canada at the expense of the manufacturing community of the country.

We are not contending that mine operators think that the present tariff is not susceptible of equitable modifications. But we certainly hold that the extremely radical and, in a fiscal sense, almost revolutionary proposals on which we have commented, are of such a nature as to impair the fabric of Canadian industry, viewed as a whole. In our view, the requisite modifications of the tariff, so far as the mining industry is concerned, could easily be agreed on in consultation between the mining operators, on the one hand, and the manufacturers of mining machinery, on the other. The mining operating industry can be, and should be encouraged in many ways by the Government. Fiscally, it should be stimulated in every way that is possible without the infliction of injustice on manufacturing industries already established, and which have been encouraged to reckon on a degree of such legitimate protection as renders their industry possible and their enterprise remunerative.

SOME INTERESTING FIGURES.

In an address to the Associated Northern Boards of Trade, Mr. G. C. Bateman spoke of the importance of the mining industry to Ontario, and, in doing so, made use of statistics which show what has been done. He estimates the expenditure of metal mining companies operating in Ontario up to the end of 1920, at $760,000,000. "This vast sum has been paid out by the mining industry for labor, supplies and equipment, and a large part of it has gone directly to the farmers and business men of the older part of Ontario. The shareholders in these companies received $125,000,000 in dividends on investments of $160,000,000, while the business interests received the profits on disbursements of $760,000,000. It does not seem unreasonable to assume that the business interests have profited to a greater extent than the shareholders."

Such figures as quoted by Mr. Bateman help to explain why those who are engaged in the mining industry claim that the industry is of national importance and is one which should have the intelligent consideration of Governments. Such indirect benefits as come to the Province from mining operations cannot properly be ignored by the public and would not be if the public and the Government were as well informed on the subject as they are concerning industries that thrive in the more settled districts.

The lack of interest in mining is not peculiar to any political party. All profess great interest in the development of our great natural resources, and nearly every politician finds occasion to refer to the vast undiscovered or undeveloped wealth of our country. But few of these gentlemen take sufficient interest in the development to learn the facts, and to formulate and fight for policies that will be really helpful. We must of course, all realize that Ontario's mining industry is young, and that its place in the life of our people is not yet well understood. The strange behaviour of Governments, in matters that affect the mining industry, is the natural result of the educational system, which is designed to lead young men into safe and proven fields, rather than to venture out into new fields and run the risks and share the trials and triumphs, of the pioneer. In our cities, and in towns and villages of the agricultural districts, mining, as an industry, is scarcely known. Small wonder, then, that the men who risk lives and futures to make mines in the wilderness are not highly regarded by the men who are elected to govern. The successful miners are seldom given credit for building up industries that are a benefit to the community. They are recognized for their money rather than for their works. Some of our people are even desirous of taking back from successful companies the lands which they have, by their industry, made valuable. Others, who cannot appreciate the difference between mineral deposits and profitable producing mines, like to regard the mines as public property, which should be worked for the public benefit alone rather than for those who have made the deposits commercially valuable by expenditure of money and labor.

Under such conditions, it is but natural that men in the mining industry have frequent occasion to ask for better understanding of their enterprise by the public. Such figures as Mr. Bateman has collected help to indicate, in terms that are easily understood, the importance of the industry. In addressing such men as compose the Boards of Trade, Mr. Bateman is helping the industry, and we can well thank him for his contribution towards a better understanding of the industry by the public.

THE FUTURE OF GOLD MINING.

That the mining industry is attracting some attention in Toronto is indicated by the fact that the "Globe" comments on Premier Smuts' recent remarks on the gold mining industry of the Rand and says of Ontario gold mining industry: "Last year Canada's whole gold production was valued at about $16,000,000. Today the gold mines of Northern Ontario alone are producing at the rate of nearly $20,000,000 a year, or nearly 40 per cent. of the output of the United States. Ontario's mines are not dependent upon the premium which General Smuts says is keeping a score of South African mines alive. Revenue from exchange is surplus profit—pure 'velvet' for the mine owners. In the Northern Ontario gold mines this Province and this country have an asset which is peculiarly valuable at the present time. It is only in the early stages of its development, and it is destined to be an economic factor in the life of Canada beyond anything imagined a few years ago."

The development of our mineral resources is evidently attracting some notice, and the possibility of gold mining becoming a great industry here is not altogether ignored by our leading newspapers. Some day the newspapers will begin to help the public to think of mining as an industry that can be honorably engaged in. The risks that men take to develop mines will then not be so easily spoken of as dangerous speculation, and the efforts of the builders of new industries in the wilderness will be praised quite as loudly as the works of those who travel the safe and easy paths of the older settled communities.

To encourage the development of mineral resources means to encourage the taking of risks both physical and financial. Mining is a hazardous business and many have not the courage to take the necessary chances. It is natural that men who hold responsible positions should not appear to encourage speculation, even if they believe it necessary in order that there may be progress. Even among mining men we frequently find persons who like to delude themselves and others with the idea that mining is not a venturesome

business. We are inclined to view such expressions not as the results of experience, but rather as an effort to make mining appear respectable. If to be respectable we must engage only in business that does not entail great risks, then the future of gold mining must depend on the efforts of those who are yet called speculators.

The results being obtained by our successful mining companies can safely be commented on by our most highly respectable newspapers without giving them the appearance of encouraging the taking of risks. It is not possible to make mines without taking great chances, but the evidence that there is some chance of winning is not without effect on public opinion. The future of gold mining in this country continues to depend on the prospectors who run chances on making discoveries and on men who risk money to develop the prospectors' discoveries.

EDITORIAL NOTES.

In South Africa the future of the gold mining industry is attracting the serious attention of the Government. There the interest rises because of threatening decrease in production. In Ontario we need Government attention to help increase production.

Another addition to gold producers of Ontario is to be made shortly. The Ontario Kirkland mill is nearly ready for operation.

Larder Lake gold area is receiving a great deal of attention now. Coniagas and Crown Reserve mining companies are interested. Canadian Associated Goldfields has been for some time almost alone in the area, but seems now likely to have the advantage of activity on neighboring properties.

The Toronto branch of the Canadian Institute of Mining and Metallurgy is holding a series of winter meetings. Some of the members are displaying an interest in Institute affairs that should have good results.

In our opinion the best thing the Mining Institute has done for some time was the sending of the Secretary on a tour of the mining districts.

REVIVAL OF NOTED ASBESTOS MINE.

During the past few months, says the Financial Times Asbestos Corporation of Canada has been increasing its production, and is now operating 50 per cent greater than during the dull period of last summer.

Its mines are being operated six days per week, as compared with four days per week last August.

Generally speaking, operations in the asbestos industry are carried on under adverse conditions at the mines in the winter time, and in consequence a very considerable number of mines are closed down in whole or in part, until the weather moderates, and the approach of spring relieves the situation.

Following its customary policy, however, Asbestos Corporation will maintain operations throughout the coming winter to the greatest extent consistent with the situation, and with its general plan to keep its staff employed as fully as possible.

Industrial conditions during the current year have been particularly bad everywhere, and the asbestos industry was no exception to the rule. The opinion was expressed to The Financial Times by an authoritative source, that, in line with other industries, the asbestos industry probably encountered the worst period in its history during the year 1921, it being added that the trade hoped, and also believed that it would prove the worst period the absestos industry would ever have to pass through.

European Market Affected.

The weakness of European exchange has probably been a more prominent factor in the case of asbestos than in most other lines. This is accounted for by the fact that the producers of asbestos depend upon their exports to Europe for an unusually large per centage of their business. Germany, in particular, has been a large buyer, and the asbestos industry of Europe may also be said to have centered in that country. The fact that the German mark has fallen to about one-fiftieth of its par value has been a most adverse factor.

The near future of the asbestos industry will depend to a very considerable extent on the movement of the mark and European exchange.

Asbestos Corporation of Canada probably goes in vicinity of 60 per cent of the asbestos business of Canada. It has been fortunate in overcoming to some extent the obstacle of depreciated exchange, and the hope is indulged that International relationships and exchanges will adjust themselves gradually hereafter, in such a manner that the export trade will not only be maintained at its recent volume, but will permit of the industry getting back to normal.

The Corporation, by reason of its conservative policy will, it is believed, be able to show a satisfactory financial statement for the current fiscal year at its annual meeting. Shareholders have been in receipt of their regular dividends and there is every reason to think that the surplus has been well maintained.

LA ROSE TO GO DEEPER ON VIOLET.

La Rose, says a despatch dated the 26th November, from Cobalt to the Toronto Mail & Empire, has decided to go deeper on the Violet vein, where results have been so good at the 530-foot level. This week sinking of the winze to 600 feet was started and if results are as expected at the deeper level the main shaft will be continued from the 470-foot level. On the 530-foot level a shoot of ore 225 feet long has been developed. Both ends of the drift are in ore, so no idea is had yet of the full length of the shoot. While not a very high-grade vein, values are found over a width of about five feet. The value of the whole 225 feet is about 30 ounces to the ton. It will be seen that this shoot is of considerable size and importance. Stopes started at the 530-foot level have been satisfactory. All work on the level will be stopped while the winze is being deepened. To handle the higher grade ore being sent by La Rose to the Bailey mill the milling company is now installing a ball mill. This will allow of finer grinding, giving a higher recovery.

The McMurray Tar Sands

By Dr. K. A. CLARK, Road Engineer.

The Industrial Research Department of the University of Alberta has undertaken the study of a separation process for reclaiming the bitumen from the "tar sands."

Bitumen from the "tar sands" may prove to be the remedy for Alberta muddy roads.

Probably no other natural resource of the Province holds quite the lure and fascination for the public mind as the "tar sand" deposit of Northern Alberta. While the scramble for oil goes on, and while we wait in expectancy till some of the drill-holes going down all about us shall tap some hidden petroleum pool, the "tar sand" deposit stands plainly in view, the biggest thing of its sort in the world, for anyone who passes to see. The deposit contains more mineral oil than the whole world could use for some time to come. But, because no one has yet discovered the secret of how to take the oil away, it remains there, year after year, unmolested. Many have looked for the secret. Samples of the "tar sand" have found their way far afield, and many technologists have given the material more or less their thoughts and attention. But still the deposit remains unexploited.

The Province of Alberta has recognized the futility of waiting for the development of this resource as the result of the efforts of outsiders, and has decided to shoulder the burden of her own problem. The answer to the "tar sand" riddle is now being systematically sought at the University of Alberta. The Industrial Research Department has undertaken the work and hopes to find the way to make available the content of the "tar sand" which is of value. It hopes to go further and fit uses for it to economic conditions in the Province. The attempt will be made, for instance, to demonstrate that the "tar sand" bitumen can be used in improving the highway conditions in Alberta.

Appearance of "Tar Sand."

One travelling into the Northland by way of McMurray and the Athabasca River can see the "tar sands" exposed on the banks of that great waterway for a distance of more than one hundred miles. The material can also be seen in the banks of the tributary streams. Such evidence has caused geologists to conclude that the deposit must extend over an area of at least 10,000 square miles. By the action of water during some past geological age, a huge bed of sand, approximately two hundred feet in thickness, was deposited on a floor of limestone over this great area. Succeeding ages buried the sand beneath several hundred feet more of other material. But, in the meantime, petroleum from some source that the geologist has not yet determined leaked into the sand and coated all the particles with a heavy mineral oil. The bituminized sand bed would be unknown to us to-day and safely hidden away if it were not that the Athabasca River and its tributaries had cut down their deep valley trenches through the covering to the sand and brought it to view. Most of the deposit, as a matter of fact, is hidden away under its heavy overburden and might about as well not exist. For it is only the material that is uncovered along the river valleys that is ever likely to be of any practical use.

A close examination of the "tar sand" shows it to be a dark brown to black looking material, soft enough, when fresh and not too cold to be deformed by the pressure of the fingers, and sticky enough to soil them with the tar. It has a decided petroleum smell. A magnifying glass enables one to see that each of the small sand grains is surrounded by a coating of the sticky oil. This oil, in a good sample, makes up about one-third the volume of the "tar sand." It represents, however, only one-fifth of the total weight.

If the "tar sand" deposit were located in the populated part of the Province, a certain amount of it could be directly utilized. Similar material occurring in certain parts of California has long been used for making pavements. There is a pavement in Edmonton built for demonstration purposes by the Dominion Department of Mines from the McMurray deposit. The small amount of useful material in the crude product, however, is an insurmountable obstacle in the way of its transportation to any distance. Since four-fifths of the weight of the material is worthless sand, it is not hard to understand that it will not take much shipping charges to bring the cost far in excess of any value it may possess.

How To Use It.

There is only one way to utilize the "tar sands" economically. Some scheme must be devised whereby the sand and bitumen may be separated from each other at the deposit, the sand discarded, and freight paid only on the bitumen to the point where it is wanted. Many schemes to accomplish this end have been proposed, and not a few have been tried. Most of the schemes fall into one of two classes. They either aim to take the bitumen away from the sand by driving it out with heat, or else by dissolving it out by some liquid in which the bitumen is soluble. Both schemes work, but not economically. The heating, or retorting, method is faced with the necessity of heating for nothing four times the weight of sand that there is of bitumen. Further, all the bitumen cannot be driven out by heat. Quite an appreciable portion of it remains and is destroyed. The solvent method is also inconvenienced by the necessity of handling large quantities of sand, which make it difficult to prevent loss of solvent which is a more valuable commodity than the bitumen being reclaimed from the sand.

It appears that some new lines of procedure must be thought out if the "tar sand" problem is to be solved. It is to this task that the Industrial Research Department has been set. Investigational work has been proceeding for some time now, and with considerable progress.

The Research Department does not, however, propose to leave the question when a separation process

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* The term "tar sand" is a misnomer which is only justified by its wide popular acceptance. Tar is a term reserved for the oily distillate obtained in the destructive distillation of such substances as coal. "Bituminous sand" would be a better name. Bitumen is a very general term. The bitumen present in the McMurray deposit is a heavy asphaltic oil such as might be obtained by the partial evaporation of an asphaltic petroleum.

has been found. This would be to only half solve the problem. It is useless to extract the bitumen if there is no use for it after it is extracted. It is a common belief that the mineral oil that is present in the "tar sand" is on a par with petroleum such as is obtained from an oil well. There is a very real difference. When petroleum is distilled, light oils such as gasoline, kerosene, etc., pass over, while the part left in the still becomes thick and heavy. The material in the "tar sand" is more like what is left of a petroleum after the distillation process. Unfortunately much of the valuable parts of the original petroleum that leaked into the sand has disappeared. The "tar sand" will be a very unimportant source of gasoline. The most of the bitumen will have to be made use of in some other way.

For Rural Roads.

The Province of Alberta has one great need, and it is an idea of the Research Department that the "tar sands" can be made to fill it. Alberta needs serviceable rural roads, and is at a loss to know just how they are to be obtained. It is not at all improbable that the "tar sand" deposit is Nature's compensation to this Province for withholding the common stone road-building materials. Alberta is a Province where the earth road in some form must be the prevalent type. Soil materials must form the bulk of any road structure if the prohibitive expense of imported materials is to be avoided. Alberta earth roads, on the whole, are fairly satisfactory when they are dry, but when the wet weather comes their stability vanishes. Is there any way in which the earth road can be kept as satisfactory under wet as under dry conditions? Some preliminary experiments performed in the Research Laboratory seem to indicate that a reasonably small percentage of the bitumen extracted from the "tar sands" when incorporated into clayey soils prevents them from turning soft and sticky when exposed to moisture. The bitumen mixes with little difficulty into the wet clay soil. When the soil again becomes dry it is found that its behaviour toward water is decidedly modified. Work is under way to thoroughly investigate this effect, and to ascertain how much it can be counted upon to solve the earth road difficulties.

The Industrial Research Department believes that the "tar sands" and the earth road present phases of one big problem, and that the solution of the one involves the solution of the other. The bitumen, to be made available for economic use, must be separated from the sand with which it has been associated. At the present moment, however, it is not evident that there is any important economic use which would take care of large production of tar-sand bitumen. The development of a method for utilizing this bitumen in the construction of an economic type of improved rural earth road seems to offer one of the best foundations for the development of a "tar sand" industry.

ONTARIO KIRKLAND TO START HOISTING.

According to a despatch from Kirkland Lake to the Toronto Mail and Empire the power company was to turn full power into the Ontario-Kirkland motors and the management will begin hoisting ore into the mill. On Tuesday the mill will be turned over, and another gold producer will be added to the Ontario list of bullion makers.

The Ontario-Kirkland, financed almost entirely by Pennsylvania men, will make Kirkland Lake's fifth bullion maker against Porcupine's (at present) three producing gold mines.

Developed a half-mile south from the "main" break of Kirkland Gold Camp, the Ontario's efforts have demonstrated the existence of a second pay ore zone when for years it was thought that only one zone ran through the camp. The Ontario's success had something to do with widening the exploration of the field, with the result that three zones have been located definitely, and evidence of others has been secured.

The Ontario's mill, construction on which started only last summer, is of 100 tons daily capacity. The ore in the mine, as developed to date, will average around $15 a ton. A monthly output of between $40,000 and $50,000 is indicated. There should be a very fair percentage of profit. The deepest workings are at the 450-foot level, with most of the ore encountered to date on the 300 and 450-foot levels.

The first serious work on the Ontario-Kirkland commenced in 1916, under an option which was dropped because payments could not be arranged satisfactorily. The present operations were begun about a year later, under the management of Mr. Ralph Hurd, one of the pioneers of the district.

The company adopted the plan of having its mill erected by contract. Hill, Clark and Francis had the contract and they fabricated and set up the mill building, and installed all the tanks and machinery connected with the tanks. Ontario-Kirkland officials found this a good way, and were saved considerable money over what the cost would have been had they performed this work themselves, owing to the fact that the contractors already possessed the constructing equipment and organization.

ALBERTA COAL FOR PACIFIC MARKET.

The coal operators of the Province of Alberta are looking for a market on the Pacific Coast. Negotiations are under way between the Government of the Province of Alberta and the Vancouver Harbour Commissioners, having in view the construction of the floating dock in Vancouver Harbour. The object of this would be to permit the bunkering of steamers with Alberta coal on the Coast. No definite action has yet been taken, but it is thought likely that the project will be carried through, as the Alberta coal men are confident of their ability to meet the competition of British Columbia coal, provided the facilities indicated are arranged for.

WHITE LAKE COLLIERIES.

The White Lake Collieries, controlling a considerable area of coal bearing lands in the Nicola-Princeton District, have obtained the advice of mining engineers as to the possibilities of these lands, and have received very favourable reports. The result is likely to be the inauguration of drilling on an extensive scale in order that the opinions of these engineers as to the coal content of the region may be confirmed. If the results are satisfactory, there is no doubt that considerable capital will be invested and a new industry of importance launched. The coal in question is said to be of an exceptionally high quality in comparison with other Pacific Coast coals.

Rossland and Its Future

Well-known British Columbia Mining Authority Sees A Good Future For This Important Mining Camp.

Mr. E. A. Hoggen, a well-known authority on mining matters in British Columbia speaks highly of Rossland future prospects in the Vancouver Daily Province. He says: Rossland has been the most productive mining camp in British Columbia, and it has brighter days ahead than ever. With this year's production, Rossland will have produced 5,600,000 tons of ore, from which have been smelted about 2,800,000 ounces gold, 3,400,000 oz. silver, and 110,000,000 lbs. copper valued at $76,673,000. This represents 25 per cent. of the total lode mineral production of British Columbia, and more than 50 per cent. of the lode gold production. The experimental metallurgical work carried out by the Trail Smelter shows that millions of tons of mineralized rock, hitherto considered valueless, can be milled and smelted at a profit, and it is to utilize this huge reserve of low grade ore that the Consolidated Mining and Smelting Company has planned a mill to be erected in units, each capable of treating 1,500 tons a day, with a total capacity eventually of 5,000 tons a day. The mining of this low grade ore will employ a much larger amount of labor than has been required in mining the higher grade ores hitherto mined, and will probably double the production of Rossland.

New Mines May Be Added.

While there are only two operating companies in Rossland — the Consolidated Mining and Smelting Company operating the Le Roi Centre Star, White Bear and War Eagle Groups of mineral claims; the Le Roi No. 2. Ltd., operating the Josie mine—there are many claims on which mineral has been proved, and some of which may yet be added to the list of producers. Le Roi No. 2 Limited is the only gold mining company operating in the province backed by English capital, and it has arranged to increase its production by the addition of an oil flotation addition to the concentrating mill. This company has profitably concentrated ore as low as 46 cents per ton in gold, 0.5 oz. silver, and 20 lbs. copper. Its production has varied from the annual returns showing from 10,000 to 28,000 oz. gold; 12,000 to 30,000 oz. silver; and 500,000 to 1,000,000 lbs. copper.

Dividends.

Rossland mines have paid $4,550,000 in dividends, since the Consolidated Mining and Smelting Company, Limited, acquired the Le Roi and War Eagle-Centre Star groups, part of its dividend distributions should be credited to the Rossland mines which have thus re-paid their investors probably around $5,500,000 in dividends, while another $5,000,000 was earned as profit on the sales of mines to investors.

"The following companies paid dividends:

Le Roi No. 2, Limited	$1,620,000
Le Roi	1,475,000
War Eagle	1,245,000
Centre Star	210,000

Holdings of Consolidated Mining and Smelting Company.

The Consolidated Mining and Smelting Company Limited, has been steadily increasing its holdings at Rossland. It started by acquiring the War Eagle and Centre Star. In 1907 the Iron Mask, Idaho and Enterprise were added. In 1912 the Le Roi group was bought from the English company originally organized by Whittaker Wright; also the Virginia, Abe Lincoln and Iron Horse. In 1914 the Mabel, Paul Boy, Edie J. and Annie E. claims were added, and also the holdings of the Canadian Goldfields Syndicate. The White Bear group was subsequently bonded.

Nature of Mineralization.

There are two main mineralized belts in Rossland, known respectively as the North and South belts. The Consolidated has acquired the pick of the North belt. The ores of the North belt are copper-gold; those of the South belt carry galena, zinc blends and stibnite with a little gold. It is possible that the South belt may yet develop important mineral deposits, though it is at present neglected. It includes the Lily May, the first claim located at Rossland. The Consolidated properties give about two miles of mineral zones on the strike of the main veins. There are three of these veins, known as the Centre Star, War Eagle and Le Roi respectively, besides numerous small veins. These veins occupy shear zones in which ore shoots from 3 ft. to 50 ft. in width and from 50 ft. to 600 ft. in length. Gold values run up to 5 oz. ore ton, and copper values to 2 per cent. When first opened these mines carried high copper values. Now the copper is low and the values are mainly gold.

This Year's Tonnage.

The Consolidated Mining and Smelting Co. Limited has mined the largest amount of ore this year since 1916. The year's production will amount to about 130,000 tons, from which will be derived about 72,000 oz. gold,70,000 oz. silver and about 2,000,000 lbs. copper, of a total value of about $1,750,000. The production is likely to be increased from now on provided labor troubles do not upset the company's plans as in the past.

The new mill will doubtless be gone on with at an early date since the metal markets are improving. This mill will require a production of 450,000 tons a year to keep the first unit running, and will represent an annual value of about $1,500,000 a year. The mill when completed to the full capacity proposed, will handle 1,500,000 tons a year, of an annual value of about $5,000,000. In its best days the largest tonnage of the Rossland camp was 360,783, valued at $4,255,958. The highest value produced in any year was $4,893,395. The lower the grade of ore that can be profitably mined, the better it is for the miner, and for the camp, as the number of men employed is proportionate to the greater tonnage that has to be raised, and the larger the payroll on which the town depends. This is the justification for the forecast that Rossland has in sight the best days the camp has ever known.

Development.

Some idea of the amount of mining that has been done at Rossland may be gathered from the fact that the underground workings aggregate over 60 miles and the ore deposits have been worked to a depth of about 2,000 feet.

Other Mines.

Other mineral Claims in the North belt of the Rossland camp which have been shippers and may again become producers, are Nickel Plate, which shipped about 500 tons of $40 ore; Columbia-Kootenay, which shipped about 6,000 tons with values from $11 to $50 per ton; Cliff-Consolidated St. Elmo, shipped 1,517 tons, valued at $9.46 per ton; Spitzee, operated by the late Alex. Sharp, M.E., and which produced 5,000 tons of $12 ore; Giant, shipped 4,344 tons of $12 ore; Evening Star, shipped 899 tons running from $24 to $32.80 per ton; Jumbo, 30,000 tons, carrying $7.00 to $20.00 per ton; O. K. shipments, valued at $20,000. In addition to these there are several claims of which development has shown promising prospects, which await further development to ascertain their value.

The Velvet, 6½ miles southwest of Rossland, shipped about 100 tons valued at about $12 per ton.

South Belt.

Shippers in this belt are: Bluebird, 432 tons of ore averaging $28 to $35 per ton; Crown Point, 267 tons, averaging $35 per ton; Curlew, 7 tons; Homestake, 14 tons, varying in value from $4.40 to $150 per ton; Mayflower, 36 tons, valued at $56 per ton; Maid of Erin, 12 tons, valued at $38 per ton; Richmond-Lily May, 12 tons, valued at $32 per ton; Sunset 19 tons.

Largest Gold Producer.

Rossland is the largest gold producer in British Columbia to-day, and has the resources to enable it to maintain the position of the leading gold mining camp of the province for many years to come. Geological conditions are similar to those of Butte, Mont., and Namaqualand, South Africa, in operation since 1902. The mineralized area is proved over 9 square miles representing the site on ancient volcano. Discovered in 1887 it had the difficulties to contend with of want of transportation and smelting facilities. The first shipment of ore was packed by mules to the Columbia River, and shipped to a Montana smelter, giving a return of about $100 a ton. This fact at once attracted the attention of mining men to the new camp. By 1895 the camp had made such progress that it had two-dividend paying mines in the Le Roi and War Eagle. Then followed the erection of the first smelter at Trail to treat Rossland ores, and railway transportation followed. Electric power was provided from Bonnington Falls. Then came the boom from which the camp suffered for some years. The next set-back was the miners' strike which closed the camp for about a year. The exhaustion of the richer ore-bodies and the difficulty of working out a successful method of treating the low grade ores caused the shut-down of several mines. Yet, with all these difficulties, the camp has maintained an average output of about $3,000,000 a year for 22 years.

The Low Grade Ores.

In 1903 the necessity of working out the problem of concentrating the low grade ores was recognized and much money expended on it by interested companies. For 16 years, the best scientific talent that could be obtained was employed on the problem. Eighteen months ago it was successfully solved by the metallurgical staff of the Consolidated Mining and Smelting Co. of Canada, Ltd., and plans put in hand for the erection of the necessary mill. Construction was started at a site between Rossland and Trail, but in the closing months of 1920 the aftermath of the war disorganized finance, the metal market, and closed most of the mines. The work was suspended in consequence. Now that mining conditions are improving it will be again put in hand and carried to competition, turning to economic account millions of tons of minerals hitherto considered valueless; and adding probably $100,000,000 to the realized wealth of Rossland.

Not only will that camp benefit, but the work done by the Consolidated Mining and Smelting Co. Limited, on this problem has opened the way for the economic utilization of vast resources of mineralized ore bodies hitherto considered of no account, and the value added to the wealth of Rossland will be multiplied many times by its application to other similar low grade mineral deposits in the province.

With Rossland leading the way in the increase of gold production we may expect renewed activities in other sections of the province.

RAND MINING POSITION.

A despatch from Johannesburg shows that the mining position in South Africa is such as to necessitate the severest economy, owing to the dependence on what is known as the "gold premium." It is so serious, in fact, that General Smuts, the Premier, recently met a deputation of the South African Workers' Union thereon. According to the despatch in question, the momentous position which has arisen with regard to the whole gold-mining industry as the result of the conference between the Government and the white miners is the great topic in Johannesburg.

The new proposals would mean a slight diminution in the number of white miners, as compared with that of native labourers, and also result in considerable economy. The white miners so far oppose the proposals, and the Rand is now faced with the possibility of a far-reaching settlement, or, on the other hand, with the probability of a refusal on the part of the men to accept the position.

General Smuts says he joined the conference because he felt the gravest concern for the position of the gold industry. That industry had been drifting into a more dangerous position for many years. It seemed to him that the time had come for the Government and the people to review the situation very carefully, and, unless they were prepared to court disaster in the not distant future, they ought to begin to put their house in order.

The gold industry to-day continued to exist on a mere fortunate accident, namely, by the grace of what was called the "gold premium." If that premium were to disappear half the Witwatersrand would close and that premium must come down.

If, for instance the Prime Minister added, America cancelled the war debt owing by Great Britain to the United States the exchange between Great Britain and America would be restored and the gold premium would disappear in one swoop. Hence the industry should be run independent of the premium. There were 39 gold mines working to-day. Of these 24 would close down immediately if the premium disappeared.

The Prime Minister emphasized the fact that if the East Rand Proprietary Mines closed down and pumping ceased it would practically mean a wash-out of the Witwatersrand from the Geldenhuis Mine to

Benoni, and a similar situation was possible on the West Rand. After most serious consideration the Government had come to the conclusion that the only means of improvement was to make native labour underground more efficient, and it asked the conference to give this scheme a trial. He was informed that the new regulation would not affect white labour detrimentally, although it would doubtless prevent the appointment of the large white force which would be necessary if the present regulations remained in force.

The Prime Minister then gave an assurance that there was not the least idea of touching the position of white labour on the mines, otherwise he would not look at it, but he was convinced that it would lead to a slight increase in the employment of whites.

In the course of his statement the Prime Minister gave a detailed description of the position in the industry, contrasting the year 1914 with to-day. Working costs, he said, had risen by 8s. 5d. per ton, while wages had increased 54 p.c. and were now about £11,000,000 yearly. Nevertheless, efficiency, if anything, had decreased, and native labour efficiency had gone down by 13 p.c., despite a slight increase in wages.

Summing up the position, the Premier asserted that, in seeking a solution of the danger threatening the existence of the Rand, in future he would not look to white labour nor to the removal of the colour bar, nor to the importation of more natives, but to the one vital matter of the real working efficiency of the natives. He appealed to the deputation to give it a trial.

The miners' delegates, in rejecting the proposal, maintained that it meant the removal of the colour bar.

Mr. Hendricks, the miners' acting secretary, said if the proposal were gazetted there would be a general strike on the reef and the coalfields within 48 hours.

It is understood that there is every likelihood that the matter will be re-discussed at a conference between the Chamber of Mines, the Mineworkers' Union and the Government representatives next week.

The Financial Times, of London, (Eng.), has the following comment to make in the matter:

"Theoretically, a decline in the paper-price of gold should be compensated for by a rise in its purchasing value against commodities and wages. Already this has happened in a degree, but the danger is that the mines—as well as other industries—may be crippled by the remedy coming too slowly after the disease. As has been found the world over, and is virtually inevitable, it is much easier to put wages up in a period of prosperity than to bring them down again in the lean years such as we are now experiencing. With a view to tempering the wind to the lamb's natural disinclination to be shorn, General Smuts and the leaders of the Rand industry have put forward a bold programme for improving the efficiency of the mines.

"By allowing the natives to take over certain tasks which they are quite capable of doing, and which do not justify the employment of highly-paid white labour upon them, the mines would be able to obtain a much higher output for the same—or a smaller—aggregate of cost than at present. They would thus be able to go some way towards reducing expenses per ton of ore from their grossly inflated post-war level. The miners' delegates' futile reply to General Smuts is that the suggested reforms would mean the removal of the "colour bar," and that the gazetting of them would be followed by a general strike on the Rand and the coalfields within forty-eight hours. This reply is, as we have characterised it, futile, because there are only two alternatives before the white miners. Either they must consent to a much more drastic reduction of their own wages than has already been agreed upon or they must co-operate with the native workers in giving a much-increased ratio of efficiency. Failing the carrying through of either of these alternatives half the mines of the Rand will find themselves compelled to suspend operations when the paper price of gold settles down at a low level. Then for a majority of the white miners there would be no "colour bar," or anything else, left to strike about. They would simply join the ranks of South Africa's already numerous unemployed. Happily further conferences are to be held, during which it is to be hoped that the men's representatives will see reason."

PROSPECTORS AS MILLIONAIRES.

Northern Ontario, says the Northern Miner has made millionaires of very few prospectors. Probably Harry Oakes and Bill Wright are the only ones who can count up to seven figures, but scores of them became wealthy, like Barney McEnaney, with his half million and Aleck Gillies and Ben Hollinger with their $150,000 odd. If one were to scout around he could dig up 50 prospectors who have made $50,000 and more, enough to keep them for life, from their lucky strikes. Harry Oakes is the only man in the North who staked a gold claim and carried it through to the producing stage without control.

The Ontario gold and silver mines have been most kind to the men who got into the mining game in its infancy, or into recent camps in their first days, on the financing and operating end. Twenty millionaires have been made by Cobalt, Porcupine and Kirkland Lake, and in nearly every case they were poor men to start with.

And then the dividends that have gone out to shareholders; they have enriched many a bank account, built many a fine home and made many a family comfortable. Perhaps we do not hear so much of the dividends, the rewards of fortunate investment, as we do about those who took a flyer on the mining market and landed wrong side down, but figure for yourself—115 million dollars in dividends, from the Ontario gold and silver mines, in little more than ten years, well,—real mining pays. Now to, the list of prospectors who have made a big killing in Northern Ontario add the name of W. H. Wright. He was a quietly pleased man when a few days ago Wright-Hargreaves Mines, Limited declared its initial dividend, one of five per cent. That dividend meant a cheque for $26,896.35 to him, a rather handsome windfall especially as the mine is showing that there are many more to follow, but the worth of the dividend exists mostly in the establishing of value to his shares. Mr. Wright holds 537,927 shares of the 2,750,000 in the company. That stock appears to have a price of at least $1.50 a share, perhaps much more because a block of this size fetches a higher price than a small lot.

On top of his Wright-Hargreaves holdings, Bill Wright is a large shareholder in Lake Shore of which company he is second vice-president and he had big holdings in Sylvanite, which he sold out a few months ago. He has made pleasant cleanups on other parts

of his original 17 claims in the Kirkland Lake camp. At the present time he has a deal on foot for some of these claims at a good figure. There is reason to credit Mr. Wright with being a millionaire.

Ten years ago he had nothing, except at odd times a few hundred dollars. When he left England it is said that his chief asset was the rights on a veteran lot in Porcupine, given him in exchange for a bill that a man in London owed him. He sold the veteran lot when Porcupine was enjoying its first boom, but he says that the thousand odd dollars he made selling this was eaten up in travelling to England, and in legal expenses trying to establish title.

His next important move was into Kirkland Lake. He was one of the first small batch of prospectors in that now thriving camp. Harry Oakes, another of the prospector millionaires, came in at the same time. Bill Wright may have had a little more than Oakes when they pushed through the bush to the lake that a government clerk honored with her name, but he didn't have much. Oakes staked the Lake Shore Mine, and was also connected with the staking of the Tough-Oakes and other properties in the district. Wright, in company with his partner Hargreaves, staked the claims that now make the Wright-Hargreaves Mine. Hargreaves sold out a fortnight after staking, getting a respectable sum for his interest, but an amount comparatively small compared with what he might have had if he had stuck like his partner. Altogether Wright staked and acquired 17 claims to the east of the lake. And he made the first discovery of visible gold in Kirkland Lake camp. That was in the fall of 1911.

Big developments have followed since that day. The Wright-Hargreaves Mine, moneyed by New York State people, has stepped into place as one of the most promising gold mines on the continent and considering its size it is probably the best equipped of any in the North. Its mining and milling machinery are perfect samples of the latest Northern Ontario practise. Its ore is rich as Northern Ontaria gold ores goes, averaging $15 to the ton, and there looks to be lots of it.

Bill Wright puts on no airs. He is unassuming to the point of modesty. And to look at him you'd never know he had a million. Most decidly he refutes the claim that wealth brings worries. He is unmarried, and lives at Haileybury when he isn't off prospecting.

To show you the kind of man he is, when the war broke out he enlisted. He served with the Canadians in France, the front line troops. He was pretty well fixed then but as he says, "I would have had to go if I had had 100 times the money." He served all the time as a full buck private. "I wouldn't even let them make me a lance jack."

U. S. PRODUCTION OF PETROLEUM.

Production of petroleum in the United States, according to the U. S. Geological Survey, continued to decrease during October. The daily average for the month, 1,149,613 barrels, was 70,887 barrels a day less than the production for September, and was the smallest for the month since February, 1920. California, as a result of the strike in the oil fields, dropped to third rank, and decreased daily average production is also reported for all the other States, with the exception of Wyoming, Illinois, and Montana, where small gains are recorded. Only 752 producing oil wells are reported to have been completed during October, as compared with 2,086 wells in October a year ago.

BRITISH INDUSTRIES FAIR.

The eighth annual British Industries Fair, which embraces a large number of the most important lines of British trade, will be held in London and Birmingham from 27th February to 10th March. This is purely a trade fair where buyer and seller meet, not an exhibition. This fair, whether regarded from the point of view of size, diversity of products shown, or resultant business, now surpasses in importance and value to the world's markets any other trade fair or similar purpose. A visit to the fair will convince overseas buyers that enormous strides have been made in Britain's post war production. A considerable number of Canadian buyers are making arrangements to attend. Admittance is restricted to trade buyers on invitation of the British Government, and business is not impeded by crowds of sightseers.

The British Industries Fair covers the following industries at London:—

Cutlery; silver and electro-plate; jewellery, watches and clocks; hard haberdashery; glassware of all descriptions; china, earthenware and stoneware; paper; stationery and stationers' sundries and office appliances; printing, books; fancy goods, including travelling requisites and tobacconists' sundries; boots and shoes and shoe mercery; leather for boot and shoe, fancy goods, bookbinding and upholstery trades; brushes and brooms; toys and games; sports goods (including sports clothing); scientific and optical instruments; medical and surgical instruments and appliances; spectacle ware and opticians' supplies; photographic and cinematographic apparatus and requisites; musical instruments; furniture of wood, cane, wicker; bedsteads and bedding; carpets, linoleum, etc.; basketware chemicals light and heavy; domestic chemical products; drugs and druggists' sundries; perfumery; dyes; foodstuffs (prepared and preserved) and beverages; confectionery (sugar and chocolate); tobacco, cigarettes and cigars.

At Birmingham:—Lighting plant for electricity, gas, oil, etc.; cooking stoves and utensils, including aluminum, enamelware, etc.; foundry appliances; general hardware, including builders, marine and household ironmongery of all descriptions; general machinery of all descriptions and small tools mill furnishings; india rubber goods for industrial and household purposes; motor cycles and cycles; accessories for motor cars, cycles and aeroplanes; weighing and measuring appliances and instruments; sanitary appliances; paints, colours and varnishes and painters' requisites; railway equipment; metals of all descriptions (excluding precious metals); agricultural and horticultural machinery and implements; mining, colliery and quarrying plant; brewing and distillery plant; metal furniture for house, shop, office, garden and camp use, including bedsteads; building construction; perambulators, mailcarts and push-chairs; saddlery and harness; firearms; fishing tackle and rods; tubes in copper, lead, brass and steel and steam and pipe fittings; architectural and ornamental metal work, including gates and fencing; ropes of steel and hemp, cordage and string.

PERSONALS.

Mr. Geo. C. Mackenzie, secretary of the Canadian Institute of Mining and Metallurgy, was in Toronto on Saturday and addressed a meeting of the local branch.

Mr. Cyril A. Robothan is in Toronto.

BITUMINOUS SANDS.

Elsewhere in this issue, we publish some account of the McMurray "tar sands." The Annual Report on the Mineral Resources of Alberta by Dr. John A. Allan, Professor of Geology in the University of Alberta, contains a good deal of interesting matter on this important subject from which we make the following extracts:

Distribution.

In the vicinity of Fort McMurray, 300 miles north of Edmonton there is an extensive deposit of bituminous sands, more popularly known as the "tar sands." The bituminous sand formation outcrops along aside the sides of the Athabasca valley for a distance of nearly one hundred miles north of Fort McMurray down stream, and for a distance of forty miles in a straight line up the valley of the Athabasca from Fort McMurray. There are numerous exposures of this formation along the rivers and streams which enter the Athabasca. These exposures prove the lateral distribution of the bituminous sands. As the formations rise gently towards the north the exposures of bituminous sands disappear above the sides of the Athabasca valley or have been eroded away or covered with glacial drift, between the 25th and 26th base lines, about 100 miles by river and 65 miles in a direct line north of McMurray. The areal distribution of the bituminons sands is much more extensive than the outcrops would indicate.

Wells that have been drilled for oil and gas up the Athabasca, south of McMurray, for 150 miles, and also in the Peace River valley over 200 miles west of McMurray, have proven the extent of the bituminous sand formation.

At McMurray the base of this formation is exposed about fifteen feet above the low water level in the river. At the junction of House river and the Athabasca, about sixty miles southwest from McMurray, a well was drilled by the Great Northern Asphalt and Oil Company to a depth of 295 feet, but the bituminous sand horizon was not reached, and the well was still in the Clearwater shales that overlie the bituminous sands. Above Pelican Rapids and the mouth of Pelican river, thirty miles south of House river, a well was drilled by the Geological Survey in 1897-98, in township 78, range 18, west of the 4th meridian. The bituminons sands were reached at a depth of 750 feet below the surface. Drilling ceased at a depth of 837 feet, when a strong flow of gas under terrific pressure was encountered. Natural gas has been flowing out of the well into the air since that date, and it is reported that the pressure has not been greatly decreased although the flow has continued for twenty-four years.

The well record, indicates a thickness of eight-seven feet of bituminous sand, but the bottom of the formation was not reached.

Another well was drilled by the Pelican Oil and Gas Company, four miles south of the Geological Survey well, in township 78, range 17, west of the 4th meridian. This well was drilled to a depth of 2,069 feet, and the log indicates that the upper Devonian limestones were reached at 903 feet. Dowling has classified this well record and shows the bituminous sand formation, now called the McMurray sandstone, to include the strata between 843½ and 898 feet a thickness of 54½ feet.

In Peace River valley, 200 miles west of Fort McMurray the records of some of the wells drilled for oil seem to indicate that the McMurray formation (bituminous sand) is reached between 900 and 1,000 feet below the surface. Dowling shows that in the log of well No. 1 drilled by the Peace River Oil Company, in township 85, range 21, west of the meridian, the McMurray formation extends from 980 to 1,107 feet, which is the bottom of the well.

The Peace River and Athabasca sections have been studied and correlated by McLearn on paleontological evidences. He states that the thick sandstone near the bottom of this well may be correlated with the "tar sands of the Athabasca at the same horizon."

Oil seepages in Wabiskaw Lake district, about midway between the Athabasca south of McMurray and the Peace, are believed to be derived from the underlying bituminous sands. All of this evidence indicates the wide distribution of the sands which are so well exposed on the Athabasca.

The exact areal distribution of the bituminous sand formation can only be estimated, but from the extent of the outcrops and other indications it is reasonable to estimate that between ten and fifteen thousand square miles are underlain by this formation.

The bituminous sand formation is an ordinary light grey to white sandstone, more or less completely saturated with bitumen. The beds vary in color in the outcrops from black to light grey. The color depends upon the percentage of saturation in the sand and distance from the surface.

The thickness of the bituminous formation varies in different localities to a maximum of 225 feet. Toward the north and east from McMurray the formation has been completely denuded by glacial action.

In some beds the percentage of bitumen is so small that the sand grains are only coated with bitumen. In other beds in the same exposure the sandstone is supersaturated with bitumen, so that when heated by the sun the bitumen with the loose sand oozes down the surface of the exposed bed.

The texture of the sandstone in various strata throughout a single expose varies considerably from a coarse grit in which thirty per cent of the sand will pass a 10-inch mesh screen to an extremely fine silt, of which over eighty per cent will pass through a 200-mesh screen.

This marked variation in the size of sand grains is characteristic of almost every exposed section of the bituminous sand. This variation in texture must be considered in any process used for the extraction of bitumen from the sand grains.

The bitumen content in the sand also varies considerably in the different beds. In general the beds in the lower part of the formation are richer in bitumen than the higher beds, but this is not always the case. In several exposures examined on Horse creek and Hangingstone creek the richest beds exposed occur between twenty-five and fifty feet above the base of the formation.

Tests made on individual samples from various beds show that the sand contains from twelve to twenty per cent bitumen. Carefully selected specimens have tested twenty-two per cent bitumen. The average bitumen content of the sand is between fifteen and eighteen per cent. The specific gravity of the saturated sand is 1.75 to 1.80. There are, however, bands of hard nodular and ferruginous sandstone in many of the exposures, which contain little or no bitumen. Specimens collected from these bands have a specific gravity of 2.5 and 3.7. These bands are of no commercial value.

About five tons of sands were collected from an ex-

posure on Hangingstone creek and brought to the University for experimental purposes. One cubic foot of this sand weighs 120 pounds and the bitumen content is about 17.5 per cent.

Extraction of Bitumen.

The real problem in connection with the bituminous sands is one of treatment. Some process is necessary which will extract the bitumen from the sand on a commercial scale. Various laboratory processes are known which will successfully recover the bitumen, but up to the present time no process has been proven to have commercial possibilities which will extract the bitumen.

When a block of bituminous sand rock is subjected to heat the mass will soon become plastic and with further heating will flow readily, but the sand will flow with the oil, as there is no coherent material in the rock other than the bitumen.

By heating a fragment of the saturated sand in an open container, gas is liberated until all of the bitumen has been driven off and only loose white sand remains.

By heating a quantity in a closed container gas is liberated which may be condensed to a crude oil. The residue is a coke-like mass consisting of sand grains held together by a filament of bitumen residue, which remains firmly attached to the sides of the container.

Considering the extent of the saturated sands, and the quantity of oil in a ton of sand, which weighs about 120 pounds per cubic foot, this deposit is worthy of extensive investigation as the possibilities are unlimited. A simple calculation based on the distribution of the exposures shows that there are at least 189 cubic miles of bituminous sands, but only an extremely small percentage of this mass could ever be utilized. The workable portion of the formation is defined by the thickness of the overburden, so that the actual area of bituminous sand which can be utilized is extremely small in comparison to the quantity in the deposit. Even if only a small acreage can ever be utilized, and a fair percentage of the bitumen content extracted, the quantity of oil in the deposit would be an important factor in maintaining the petroleum supply of the world.

Samples of this sand are being tested in several laboratories throughout Canada, the United States, and the British Isles. The chances are favorable for the discovery at an early date of a commercial process for the extraction of the oil. It is, however, the case that a successful laboratory process might not be a practicable field process. The oil can be extracted in a laboratory by heat treatment producing destructive distillation, as described on a preceding page, and also by the use of steam hot water or various other solvents, but none are yet known to be adaptable to the bituminous sand on a practical scale in the field.

Experiments were conducted in the field in 1920 by Mr. D. Diver of Calgary with an electric heater which he designed. This heater was inserted into the bituminous sand in situ and a quantity of gas was liberated and condensed.

The analysis indicated commercially:

Illuminating oils	86.8 per cent.
Light lubricants	8.5 per cent.
Gasoline	0.0 per cent.

The analysis shows that only a fraction of the lighter oil in the bitumen was driven off by this process. No attempt was made at determining the cost of producing the heat by the process. It was an interesting experiment and it is the intention of those interested to try out another type of heater during the current year.

The economic problem on this deposit is one of treatment and extraction of the bitumen, and not one of transportation. During 1921 it is contemplated to extend the Alberta Great Waterways railway into McMurray. This will make the deposits quite accessible.

In July, 1920, the Federal Government by Order in Council No. 1495, "withdrew from sale, settlement or disposal for any purpose both in respect of the surface and the mining rights," all lands not already leased which contain workable deposits of bituminous sand. According to the records in the Dominion Land office in Edmonton, since this regulation was made, the Dominion Government has leased considerable acreage in small parcels to one General Wm. Lindsay and his associates, who claim to have discovered a commercial process for the extraction of the bitumen. These small parcels include many of the workable outcrops along the Athabasca and its tributaries.

PRODUCTION OF PIG IRON AND FERRO-ALLOYS.

The upward trend noticeable in so many lines towards the latter part of October was reflected in the output of pig iron for the month, the total being almost 6,000 tons higher than the amount reported from the Mining Branch of the Dominion Bureau of Statistics as the output for the preceding month. Basic pig iron made in blast furnaces and produced for the use of the makers amounted to 41,846 tons in October as compared with 38,590 tons in September. Basic iron made for sale rose one hundred tons to 510 tons making a total output for the month of 42,356 long tons. A total of 87 tons of foundry iron was made for further use while 7,130 tons was produced for sale. This latter figure is 50 per cent higher than the corresponding figure for the previous month. No malleable iron or direct iron castings were made in October so that the pig iron produced by makers for their own use amounted to 41,933 long tons; that for sale was 7,640 long tons, which makes a total output for the month of 49,573 tons. The average monthly output of pig iron this year to date remains unchanged at 51,000 long tons.

Ferro-alloys showed a similar healthy increase, the output for the month being 1,266 long tons as compared with 914 long tons in September. This product was, as usual, all ferro-silicon in grades of 15 per cent, 50 per cent and 75 per cent. The output of ferro-silicon in October was higher than for any month since February last when a total of 1,662 tons was made. This comparison does not hold for the total output of ferro-alloys since it is the custom to include under this heading any spiegeleisen that is produced as well as the ferro-silicon. No spiegeleisen has been made since August.

There was no change during the month in the number of furnaces operated. The five in blast at the beginning of the month continuing active throughout and being still in operation at the close of the month. These five included two at Sault Ste Marie, one at Hamilton and two at Sydney.

The gradual improvement in the steel situation noted in the September report is reflected in the October output, which, it may be expected will be well maintained

PRODUCTION OF STEEL INGOTS AND CASTINGS.

The output of steel ingots and castings for the month of October established a new high record for the year at 72,204 long tons, an increase of nearly 16,000 long tons, over the production during the preceding month, and some 200 tons more than the output for August, when the previous high record for the year was made. During the latter part of the month, particularly, there was a favorable turn in the steel making industry closely following the increased production in the United States at the same time. As noted in the preceding record the output of pig-iron recovered to the August level and in the production of steel ingots and castings the output also rose to the August mark and passed slightly beyond.

Basic open hearth steel ingots made by the several firms for their own use rose to 69,809 tons from a total of 54,320 tons in September. No acid open hearth steel was made and very little bessemer.

Electric steel ingots increased to 542 long tons or nearly three times as much as in the preceding month. From these data it will be seen that the total production by makers for their own use during October was 70,352 long tons as compared with 54,478 tons in the preceding month.

There was a small production of steel ingots made for sale. Basic open hearth steel castings made for further use amounted to 228 tons or an increase of about 50 per cent and basic open hearth steel castings made for sale rose 100 tons to 792 tons making a total for this class of 1020 long tons. Fourteen tons of bessemer castings was made for further use and a total of 113 ton was produced for sale making a total output of 127 long tons.

Electric steel castings declined slightly to 702 long tons, consisting of 6 tons made for further use and 696 tons produced for sale.

Direct steel castings for October thus amounted to 1849 long tons, of which 1601 tons was made for sale, the balance being used by the producers in further processes. The average monthly output of steel ingots and castings for the year is now 55,000 long tons in comparison with which figure the output of 72,000 tons for the current month stands out in good relief.

Table 3(a) shows the production of steel ingots and castings during the current and preceding month, and Table 3(b) shows the total output for the ten months ending September. Table 4(a) and 4(b) show the monthly outputs of steel ingots and castings for the past fifteen years.

INCREASE CAPITAL OF TECK-HUGHES.

The long awaited re-organization plan of the Teck-Hughes Gold Mines, Limited, has been announced, and details are given in a circular now being mailed to shareholders, which calls for a special meeting for December 7 to consider and confirm same. The intention is to increase the capital of the company from $2,500,000 to $4,000,000, and also provides for the sale of the unissued stock at a price of 15 cents a share. The stock is to be first offered to the shareholders on the basis of four shares of the new for five of the old, while the unsubscribed balance will be available to the bondholders. The directors feel confident that the bondholders will freely exercise their rights in this respect if the shareholders do not do so.

Plan Averts Foreclosure.

The outstanding bonds of the company, amounting to $500,000, fell due on October 1, 1920, and default was made in payment of the interest thereon. There is now past due and owing in respect of the bonds the sum of $500,000 for principal and, approximately, $135,000 for arrears of interest and interest on arrears. The directors are of the opinion that the suggested reorganization should have the approval of the shareholders, as it averts foreclosure by the bondholders and further permits them to subscribe for shares at 15 cents a share.

It is the intention to create an issue of five-year 7 per cent. first mortgage bonds to the amount of $500,000, the new bonds to be in such form as the Protective Committee may see fit, and to be redeemable by the company in whole or part at any time at par, the whole of the said $600,000 of the bonds to be delivered to the committee in exchange for the present outstanding bonds, the company to pay to the committee a sum squal to the amount by which the unpaid interest and principal of the bonds exceeds $600,000, and the committee to distribute the bonds and cash pro rata among the holders of the present bonds. The bondholders or the persons entitled to the new bonds are to have the right to subscribe pro rata for 1,720,000 shares, at 15 cents per share, subject, however, to the offer to the shareholders.

Provide Ample Capital.

The directors believe that under the new plan the company will have ample capial for its present needs, and for a contemplated increase in its mill capacity, and for development work. They also expect to be able to make early and frequent payments to the holders of the new bonds, which will be redeemable in whole or in part at any time at par and accrued interest.

Shareholders at the special meeting will also be asked to vote on a by-law to change the head office of the company from Toronto to Kirkland.

GRANBY WINS IMPORTANT CASE.

The Privy Council has allowed the appeal of Charles Wilson versus the Esquimalt and Nanaimo Railway Company, which appeal asked that a Provisional Crown Grant of Vancouver Island Coal land be set aside. A similar appeal in the case of the Esquimalt and Nanaimo Railway Company versus Elizabeth Dunlop has been treated in the same way.

This is a double victory for the Granby Consolidated Mining, Smelting and Power Company, which operated a coal mine at Cassidy, B.C., on the property in litigation.

The importance of the action to the appellants may be ganged when it is stated that the Provincial Leases in question, issued by the Province under the Settlers' Rights Act of 1917, were acquired by the Granby Company, and in their development, the establishment of collieries and auxiliary plant, the Company expended considerably over two million dollars. The collieries at Cassidy are considered to be, in point of the accommodation provided for officers and men, and also in point of the mine equipment, in every respect up-to-date.

The cases may be said to date back to 1871, when British Columbia entered Confederation, it being not many years after that a man named Joseph Ganner

occupied lands within an area afterwards designated as the Railway Belt of the Esquimalt and Nanaimo Railway Company. He died in 1889, and his executors are Charles Wilson and Angus D. McKenzie, of Nanaimo. Later, an Act was passed giving settlers only surface rights, and ever since there has been continuous agitation on the part of the settlers for a declaration that they are entitled to the under surface rights on the lands occupied either by themselves or by those whom they have succeeded.

Northern Ontario Letter

THE SILVER MINES.

Bi-Metallism.

Discussion of the question of bi-metallism by international agreement is again on the lips of operators of silver mines. There are those who believe mention of the subject at the recent Convention in Chicago of the American Mining Congress may have been significant. There are others who believe the question may be brought up at Washington should the Disarmament Conference actually result in assuring world peace. It is contended that a mutual understanding between the nations in respect to armies and navies might reasonably lead to another conference in connection with finding a solution of the financial difficulties which confront practically every European nation. Bi-metallism on a basis of 16 ounces of silver to .1 of gold would automatically fix the price of silver at $1.29 cents an ounce, and would create greater metallic backing to the large amount of paper currency now in circulation.

Haileybury Frontier.

The Mining Corporation of Canada is stated to be considering entering the South Lorrain silver area, and is reported to have secured an option on the Haileybury Frontier property. The result of work on the Haileybury Frontier during the past few months has been highly encouraging, and some pockets of high grade ore have been found. It is believed that the property has considerable merit, and that the chances of finding ore shoots of major importance are good. Were the Mining Corporation to actually commence operations in the district it might reasonably signalize a general move among mining interests to secure property in that field.

It has been learned that recent unofficial reports which intimated that a substantial tonnage of low grade ore had been placed in sight on the Reliance has so far been blocked out.

Temiskaming.

In regard to the reported possibility of the Temiskaming Mining Company receiving tenders for leases on this closed down mine, the Journal has learned that the matter was discussed some time ago in official circles, but was abandoned for the time being. It is believed that with the arrival of next spring the Temiskaming will be able to operate the mine profitably on its own account, and that a leasing system may not be expected until such time as the resources now in sight become exhausted. The mine closed down last year on account of the high cost of operation and a rapid slump in the price of silver. Since that time the price of the metal has not only strengthened but the cost of operating mines has declined to a considerable extent. In due time, however, it is probable that the Temiskaming may be surveyed out into blocks of about 100 feet square, and perhaps operated under leases.

Deeper Deposits at Cobalt.

A local paper prints an article this week, which states that not a few mining men believe there is a possibility of another zone of mineralization in the Cobalt district being found to lie at a lower horizon than that heretofore worked for silver. The article states:—"While the theory is generally accepted in Cobalt that the deposition of silver is within clearly defined limits in relation to the diabase sill, and that the fractures extending for a limited distance from the contact zones constitute the only points of mineralization, yet it is surprising to find among not a few mining men the belief that the limits of mineralization in the Cobalt field are not so restricted.

"For instance, one mining man stated recently to the representative of this paper that it would not surprise him were new mines to lie below the old, and that they might contain metal other than silver. He pointed to other mining camps where such developments had taken place, and he pointed to the occurrence of gold values of a "commercial" grade in a vein in the Kerr Lake Mine at Cobalt. The vein itself is measured in inches, and for that reason sould not be worked at a profit, but it does demonstrate the presence of gold."

Hudson Bay.

During the week ended November 18th the Hudson Bay Mine shipped a car containing approximately 64,000 pounds of concentrates. This was the only Cobalt shipper during the period.

Coniagas.

The Coniagas has suspended operations for the winter in connection with the re-treatment of old tailings. In the meantime, general operations are continued in the Coniagas Mine and Mill, and the tailings operations will be resumed in the spring.

Bailey Cobalt.

The final act that draws to a close the seven years of litigation in Bailey Cobalt Mines, Limited, was performed this past week at Osgoode Hall in Toronto, when Master-in-Ordinary Alcorn delivered into the hands of W. R. Sweeny, of New York City, representing the Bailey Cobalt Mines, Limited, Certificate for 425,000 shares of Bailey Silver Mines Limited; at the same time the Court made orders discharging the Liquidators, passing all of the accounts and ending the liquidation proceedings.

The Bailey Cobalt Company is now the owner of 425,000 shares of Bailey Silver Mines, Ltd., and it is to be assumed that the directors of the Bailey Cobalt Company will presently hold a meeting for the purpose of making proper distribution of their assets.

This litigation was bitterly fought, and the law costs exceeded $50,000.

The Professional Engineers Act.

An act respecting professional engineers, known as The Professional Engineers Act, is being pressed, and is now before the Ontario branches of the Canadian Institute of Mining and Metallurgy. The idea has been advocated for many years among mining engineers, as well as financiers engaged in the business of mining. It has been felt that mining engineers should be given exclusive right to certain letters which would constitute a distinguishing badge in a like manner as doctors, lawyers, etc.

In regard to those who qualify, the bill states:—

(1) "Only such persons who are members of the association hereby incorporated, and registered as such under the provision of this act, or who have received a license from the Council of the Association as heretofore provided, shall be entitled within the Province of Ontario to take and use the title "Registered Professional Engineer," or any abbreviation thereof, or to practise as a "Professional Engineer."

(2) "Each member of the association shall have a seal, the impression of which shall contain the name of the engineer and the words "Registered Professional Engineer," and "Province of Ontario," with which seal he shall stamp all official documents and plans, and the design of such seal shall be approved by the Council."

In so far as the preceding clauses are concerned, the idea promises to meet with quite general approval among mining men. However, the bill is marred somewhat in the opinion of many by the inclusion of other clauses which have the appearance of being objectionable.

For instance, the following, Clause 44, would prevent practical mining men from carrying on operations on any other but small prospects, and is looked upon by practical miners as going to the extreme:—

44. "Nothing in this act contained shall be construed as preventing the carrying on or construction of works by any person on his own property for the sole use of himself and his domestic establishment; nor to the prospecting or developing of any patented or unpatented mining claim by any person or syndicate; nor the designing, construction or installing by any person of works, plants or appliances of a value not exceeding $5,000, provided, however, that such works, plants and appliances shall not involve the safety or health of the general public, and nothing in this act shall be construed to apply to the construction of township roads, or roads under the supervision of a county road superintendent."

THE GOLD MINES.

McIntyre-Porcupine.

The main shaft on the McIntyre-Porcupine having reached a depth of 1,875 feet, and the sinking of an additional 100 feet to be carried out immediately, places this mine in the position of being the deepest precious metal mine in Canada. A feature of the work is that in an official statement to the Journal, General Manager R. J. Ennis declared that the geological structure continues to be exceedingly favourable, and that there is every indication that the ore deposition will continue to great depth, and that the life of the mine will be long. A production at the rate of $3,000,000 annually from this mine is assured, beginning with next spring, and the enterprise is running neck-and-neck with the Dome Mines for the position of being the second largest producer in the Dominion. The increase to $3,000,000 a year as compared with a little over $2,000,000 yearly heretofore will be the result of the installation of a new unit for the purpose of treating the carbonaceous ores found in certain parts of the mine. This new unit will be completed by March.

By reason of the achievements on the Hollinger and the McIntyre, it is learned that these companies are now turning their eyes toward two adjoining properties, these being the Schumacher on the south of the McIntyre, and the Porcupine V.N.T., on the south side of the Hollinger Consolidated. It is learned that the Hollinger has encountered good results on vein 92 at a point not far from the Porcupine V.N.T. boundary. It is also understood that the McIntyre has its attention in the direction of the Plenaurum and the Newray to the east.

Nipissing Drilling at Porcupine.

No detailed information is available with regard to the results achieved by the Nipissing Mining Company, of Cobalt, during the course of drilling five diamond drill holes on the Rochester property on the north-west side of the Hollinger. However, it is understood the core shows the presence of an intrusion of porphyry formation, and that gold-bearing deposits of an encouraging nature have been penetrated. The working option holds good for another six months, provided the Nipissing continues exploration work.

Davidson Consolidated.

Good progress is reported in connection with the development of the Davidson Consolidated. It is stated that the mine will be operated on a big scale, and officials are optimistic in regard to the result.

Gold Discovery in Bristol.

Another discovery of gold is reported to have been made to the south-west of the producing part of the Porcupine district. The new find lies in the township of Bristol, about ten miles from Timmins. Samples of the ore brought out are spectacular, and the quartz greatly resembles that found on the Dome Mines. The vein is said to measure only about 18 inches in width, but only a limited amount of prospecting has been done, and the owners are hopeful of developing larger bodies. The find is directly in line with the south-westerly strike of the ore-bearing zone of Porcupine.

Hollinger Reserve.

The Hollinger Reserve property, situated in the township of Deloro, is stated to be in strong hands, and a scheme to re-open the property is under consideration. Considerable work was done on this property by the late Barney McEnaney, and a good deal of encouragement was met with.

Wright-Hargreaves.

Output from the Wright-Hargreaves is stated to have reached $2,300 daily, and production at the rate of upwards of $800,000 annually is now indicated. A favorable factor in connection with the Wright-Hargreaves is that, in addition to having the largest mill in the Kirkland Lake district, the property also embraces a greater length of the ore-bearing zone than any other mine in that field.

Tough-Oakes.

The geological problems of the Tough Oakes and Burnside Mines are stated to have been worked out, and the enterprise is now in the line to place a substantial amount of ore in sight preparatory to re-opening the mill in the spring. Reports are current which suggest a possibility of the joint operation of the Tough-Oakes and Burnside with the adjoining Sylvanite.

Queen Lebel.

Good results are obtaining on surface at the Queen Lebel property, and an inspection of the veins by mining men of experience in the Kirkland Lake district has been followed by general favorable comment. The surface work has been efficiently done, and the property has excellent prospects of being developed successfully.

Bidgood.

Lateral operations are proceeding at the 400-ft. level of the Bidgood Gold Mines, and the work of the next month or so will probably have a vital bearing on the future of the enterprise. At the proceeding level a substantial amount of ore was opened up, and if found to continue in similar volume at the present point of operation will offer good promise of another mine being added to those already proven in the Kirkland Lake area. Reports some weeks ago that the McKinley-Darragh interests were prominently identified in the Bidgood are understood to have been in error in that it has been learned that only two officials of the McKinley-Darragh are comparatively small stockholders in the Bidgood.

Larder Lake.

With the Coniagas working property on one side, and the Canadian Associated Goldfields working on the opposite side, the Crown Reserve Mining Company is biding its time in connection with its property in the Larder Lake district.

Miller Independence.

Although diamond drilling is still under way on the Miller Independence Mines at Boston Creek, yet nothing in the way of ore has so far been encountered.

B. C. MINING NOTES.

Rich Ore at Fish Creek Mine.

Stewart, B.C.—It is reported that a strike of some importance has been made on the property of the Fish Creek Mining Company. A raise was started 160 feet from the portal of No. 1 tunnel to connect with No. 2 tunnel, 180 feet above, and a shoot of high grade ore was opened up. This is becoming richer as the raise is continued and the ore taken therefrom is being sacked for shipment. A considerable amount of ore running from $300 to $400 per ton, already has been packed down the hill, preparatory to being transported. Latest Reports from the Premier Mine are to the effect that good progress is being made in the work both at the mine and on the aerial tramway. With regard to the latter all the towers are completed with the exception of the four at the lower end and these will be up in a few days.

Trail Ore Receipts.

Trail, B.C.—Ore receipts in gross tons for the week from November 8th to 14th at the smelter of the Canadian Consolidated Mining and Smelting Power Company, totalled $8,642. Of this 8,205 tons came from the Company Mines, while the remainder was made up chiefly as follows:—Gen. Sandon, 10 tons; Horn, Silver, Similkameen 51 tons; Queen Bess, Allamo 36 tons; Standard, Silverton, 109 tons; Surprise, Roseberry, 97 tons; and Van Roi, Silverton, 92 tons.

Wallace Mines, Ltd.

Penticton, B.C.—One of the few silver mines in the Provinces which has continued to operate successfully through the period of silver depression, is the Sally Mine at Beaverdell, operated by the Wallace Mines, Limited. This mine is running steadily with a force of 15 men. Since having been taken over by the present Company, considerable development has been done and a substantial quantity of ore blocked out. In 1920 about $80,000 worth of ore was shipped. The ore mined at present runs between 300 and 400 ozs. of silver to the ton, with some lead and a trace of gold.

Taylor's Discovery at Lillooet.

Vancouver, B.C.—Further particulars of the gold strike in the Whitewater section of the Lillooet District have been obtained from E. J. Taylor, the original discoverer, who recently came to the coast. He brought with him 60 ozs. of gold, which he and another man took out in two weeks' work by means of an arrastra. Mr. Taylor's claims, situated near Iron Creek, run up the mountain side, and so far his operations have been confined to the natural dump brought down from the ore shoot through corosion. He describes the ore as being telluride in the serpentine formation, and his observations lead him to believe that the mineralized zone stretches a distance of 25 to 30 miles. It is expected that there will be much interest manifested in this district by prospectors next summer. Word has been received that the Kitchener Mines, Limited, Keithley Creek, will open next season's operations under very favourable circumstances. During the open months of this year much work was done in the installation plant, particularly with reference to providing an adequate supply of water. The Company now is prepared, as soon as conditions are right, to open up an area of virgin ground. This is an unusual condition in the Cariboo, the Placer fields of which have been well worked over since the original discovery in 1860 and the present time. Moreover, the Company, in the short time that it was able to engage in productive work this year, made some recoveries that seem to assure very good results when operations begin in real earnest. The Granby Consolidated Mining, Smelting and Power Company has entered suit in the Supreme Court against the Attorney General of British Columbia. The Company seeks a declaration with regard to its rights and liabilities under the British Columbia Taxation Act. The Company further seeks a declaration to the effect that taxes for which it is liable are not due until January 2nd next and will not be in arrears until December 31, 1922.

Yukon's Silver Camp.

Captain George Black, who is the Government Candidate for the Yukon Territory, recently visited Mayo City, the centre of the Yukon's new silver camp. He spent eight days in the Silver District, visiting Keno Hill, which will produce about 5,000 tons of silver lead ore this winter, he says. All the rich veins opened there are reported to be holding out with winter development, and Captain Black observes that he never saw so many prospective millionaires. Three Companies are working crews, including the Slate Creek Company, which has opened a new vein at Keno City at the foot of the Hill, and sunk it to a depth of 30 feet, the Treadwell Company and the Yukon Gold Company. He speaks also of the rush to Galena Hill, upon which a large number of new claims have been staked within the past few months. There are about 600 people in the entire city.

MILL AT BRITTANIA BEACH.

It is reported in the Rockland Miner that the Brittania Mining and Smelting Company has authorized the erection of a mill on its copper-gold property at Brittania Beach, B.C. The mill will have a capacity of 2,500 tons daily, which will be the greatest in British Columbia, and greater than that of the mill destroyed by fire last spring. The machinery has been ordered from the Traylor Engineering and Manufacturing Company through W. H. Agens, Spokane. The purchase

The Canadian Miners' Buying Directory.

Acetylene Gas:
Canada Carbide Company, Ltd.
Prest-O-Lite Co. of Canada, Ltd.

Acetylene Welding:
The Toronto Iron Works, Ltd.

A.C. Units:
Powley & Townsley, Limited.

Agitators:
The Dorr Co.
Can. Chicago Bridge & Iron Co., Ltd.
Horton Steel Works, Limited.

Air Compressors:
Belliss & Morcom, Ltd.
Laurie & Lamb

Air Hoists:
Canadian Ingersoll-Rand Co., Ltd.
Mussens, Limited.

Air Receivers:
The Toronto Iron Works, Ltd.

Alloy and Carbon Tool Steel:
Peacock Brothers Limited.

Alternators:
MacGovern & Co.

Aluminium:
Spielman Agencies, Regd.

Amalgamators:
Northern Canada Supply Co.
Mine and Smelter Supply Co.
Wabi Iron Works.

Antimony:
Canada Metal Co.

Antimonial Lead:
Pennsylvania Smelting Co.

Assayers' and Chemists' Supplies:
Dominion Engineering & Inspection Co.
Lymans, Limited
Mine & Smelter Supply Co.
Pennsylvania Smelting Co.
Stanley, W. F. & Co., Ltd.

Ash Conveyors:
Canadian Link-Belt Company

Ashes Handling Machinery:
Canadian Link-Belt Co., Ltd.

Assayers and Chemists:
Milton L. Hersey Co., Ltd
Campbell & Deyell
Ledoux & Co.
Thos. Heys & Son
C. L. Constant Co.

Asbestos:
Everitt & Co.

Balls:
Hull Iron & Steel Foundries, Ltd
Peacock Brothers Limited.
The Wabi Iron Works.
The Hardinge Conical Mill Co.
The William Kennedy & Sons, Ltd.

Ball Mills:
Hardinge Conical Mill Co.
Hull Iron & Steel Foundries, Ltd
The Wabi Iron Works.
The William Kennedy & Sons, Ltd.

Babbit Metals:
Canada Metal Co.
Hoyt Metal Co.

Ball Mill Feeders:
Hardinge Conical Mill Co.
Hull Iron & Steel Foundries, Ltd

Ball Mill Linings:
Hardinge Conical Mill Co.
The William Kennedy & Sons, Ltd.
Peacock Brothers, Limited
Hull Iron & Steel Foundries, Ltd

Belting—Leather, Rubber and Cotton:
Canadian Link-Belt Co., Ltd.
The Mine & Smelter Supply Co
Northern Canada Supply Co.
Jones & Glasco.

Belting:
R. T. Gilman & Co.
Gutta Percha & Rubber, Ltd.

Belting—Silent Chain:
Canadian Link-Belt Co., Ltd.
Hans Renold of Canada, Limited, Montreal.
Jones & Glassco (Regd.)

Belting (Transmission):
Goodyear Tire & Rubber Co

Belting (Elevator):
Goodyear Tire & Rubber Co.

Belting (Conveyor):
Goodyear Tire & Rubber Co.
Gutta Percha & Rubber, Ltd.

Bins and Hoppers:
The Toronto Iron Works, Ltd.
Can. Chicago Bridge & Iron Co., Ltd.
Horton Steel Works, Limited.

Blasting Batteries and Supplies:
Canadian Ingersoll-Rand Co., Ltd
Mussens, Ltd.
Canadian Explosives, Ltd.
Powley & Townsley, Limited.

Bluestone:
The Consolidated Mining & Smelting Co
The Conlagas Reduction Co., Ltd.

Blowers:
Canadian Fairbanks-Morse Co., Ltd
Northern Canada Supply Co.

Boilers:
Canadian Ingersoll-Rand Co., Ltd
Marsh Engineering Works
R. T. Gilman & Co.
The John Inglis Company
Wabi Iron Works.

Blue Vitriol (Conlagas Red):
Canadian Fairbanks-Morse Co., Ltd.

Bortz and Carbons:
Diamond Drill Carbon Co.

Boxes, Cable Junction:
Standard Underground Cable Co. of Canada, Ltd.
Northern Electric Co., Ltd.

Brazilian Rough Diamonds:
Diamond Drill Carbon Co.

Brazilian Mica:
Diamond Drill Carbon Co.

Buggies, Mine Car (Steel)
Hendrick Manufacturing Co.

Brazilian Ballas:
Diamond Drill Carbon Co.

Brazilian Rock Crystal:
Diamond Drill Carbon Co.

Brazilian Tourmalines:
Diamond Drill Carbon Co.

Brazilian Aquamarines:
Diamond Drill Carbon Co.

Bridges—Man Trolley and Rope Operated—Material Handling
Canadian Mead-Morrison Co., Limited

Bronze, Manganese, Perforated and Plain:
Hendrick Manufacturing Co.

Buckets:
Canadian Ingersoll-Rand Co., Ltd.
R. T. Gilman & Co.
Hendrick Manufacturing Co.
Canadian Link-Belt Co., Ltd.
Marsh Engineering Works
Mussens, Ltd.
MacKinnon Steel Co., Ltd.
Northern Canada Supply Co.
The Wabi Iron Works

Buckets, Elevator:
Canadian Link-Belt Co., Ltd.
Hendrick Mfg. Co.
Peacock Brothers Limited.

Cable—Aerial and Underground:
Canada Wire & Cable Co.
Northern Canada Supply Co.
Standard Underground Cable Co. of Canada, Ltd.
Peacock Brothers, Limited

Cableways:
Canadian Mead-Morrison Co., Limited
Fraser & Chalmers of Canada, Ltd.
Mussens, Ltd.
The Wabi Iron Works
R. T. Gilman & Co.

Cages:
Canadian Ingersoll-Rand Co., Ltd., Montreal, Que
Northern Canada Supply Co.
Fraser & Chalmers of Canada, Ltd
The Electric Steel & Metals Co.
The Mine & Smelter Supply Co.
Mussens, Ltd.
The Wabi Iron Works

includes grinding and crushing machinery, except for that part of the crushing plant situated in the mine which was not reached by the late fire. In the equipment to be delivered are 18 tube mills of 7 by 10 foot size, a set of 72 by 20 inch rolls and four sets of 54 by 20 inch rolls. The equipment will weigh 700 tons, will be taken through the Panama canal from the plant at Allentown, Pa., and will be delivered within less than six months. The construction of the plant will be supervised by Bradley, Bruff & La Barth of San Francisco, Cal., who designed and erected the smelter of the Bunker Hill & Sullivan Mining and Concentrating Company at Bradley, Idaho. The motive power will be electricity, which will be delivered through several motors having a total capacity of 2,000 horse-power. The contract was let by E. J. Donohue, general manager of the Brittania Company, who had bids from other builders of heavy milling machinery. The large stockholders of the Brittania Company are residents of New York, and the president is H. J. Quigley of that city. Mr. Agens left Brittania Beach before the flood that recently damaged the village and took the lives of 35 persons. Mr. Jules La Barth is well-known in Rossland, having been prominently identified with the mining and smelting business in this section a number of years ago.

TORONTO MINING QUOTATIONS.

Quotations on Active Stocks on Standard Stock Exchange, Toronto, on 29th November, 1921.

	High	Low	Last
Silver.			
Adanac Silver Mines, Ltd.	1¼	1¼	1¼
Beaver Consolidated	21	20	20
Coniagas	1.20	1.14	1.20
Crown Reserve	10¼	10¼	10¼
Gifford	½	⅜	½
La Rose	32	31½	32
Mining Corp. of Can.	1.10	1.05	1.10
Nipissing	7.50	6.75	7.00
Ophir	¾	¾	¾
Peterson Lake	5	5	5
Silver Leaf	1¾	¾	1
Temiskaming	25	25	25
Trethewey	11	9½	9½
Gold.			
Atlas	17	14¾	14¾
Dome Lake	7	5½	5½
Dome Mines	21.00	20.40	20.75
Gold Reef	1¾	1¾	1¾
Hollinger Cons.	7.95	7.80	7.85
Keora	9½	9	9
Kirkland Lake	32	30½	32
Lake Shore M., Ltd.	1.23	1.21	1.22
Mc Intyre	1.97	1.90	1.97
Moneta	8	7⅞	8
Newray Mines, Ltd.	5	5	5
Porcupine Crown	14	13¼	13½
Porcupine V.N.T.	18	16½	17
Preston East Dome	2¾	2¾	2¾
Schumacher	25½	25½	25½
Teck-Hughes	16¾	15	15
Thompson Krist	2	2	2
West Dome	6	5¾	6
Wasapika Gold M. Ltd.	4¼	3¾	3¾
Miscellaneous.			
Petrol Oil	19	19	19

METAL QUOTATIONS.

Following are the fair average prices for ingot metals (in less than car-loads):

Toronto	Cents per lb. 29th Nov. (Unchanged since last week).
Copper, Electric	17
Copper, Casting	16¾
Tin	35
Lead	6¾
Zinc	7½
Aluminium	27
Antimony	9

TORONTO COAL PRICES.

Toronto, 29th Nov.—The truest thing to say about the market for bituminous coal in Toronto at the present moment is that no such thing exists. The same thing is probably true of other places as well, but in Toronto things are certainly terribly bad from the viewpoint of the man with coal to sell. He is finding that he can't give it away. As an instsance, the writer may cite the case of a coal man who was asked by a customer today to quote him on a carload of slack. He quoted him $1.25 a ton for coal for which he had paid $1.35. The customer demurred at the price as too high and bought a car-load elsewhere for $1.00 a ton. Since then he has been offered other car-loads at 75 cents a ton. And so it goes. Nor is any improvement in this condition now to be looked for until the New Year, unless really cold weather sets in.

TRETHEWEY SILVER MINES.

The Financial Times says that the Trethewey Silver Mines will probably be reorganized within a few months. The directors are figuring out a plan that will raise, at once, sufficient money to pay off the present indebtedness of the company and give the necessary working capital to further develop the mine.

It is believed that it will be found necessary to either increase the capital of the present company or form a new one. Trethewey has in its treasury about 400,000 shares of its capital ($1 a share) and if the shares in the treasury are sold at the present market price of around 10 and 11 cents, little more than enough to make the company free of debt will be realized. The loans of the directors and the bank overdraft total approximately $30,000.

EDITORIAL

MINING—AND GOVERNMENTS.

These lines are being written before the results of the Dominion general election have been made known, and therefore before it is possible to make any reasonable or reasoned conjecture as to the complexion of the next Administration at Ottawa. But while this is yet in doubt, there is one matter as to which all engaged in, or otherwise connected with, the mining industry in this country may be absolutely certain. And that is the desirability of the new Government, however it may be composed, displaying a more active, a more sympathetic, a more sustained and (if we may say so without offence) a more intelligent, interest in the mining development of the country, as a whole, than has been evidenced in the past.

Nor need this aspiration be limited to the Dominion Government. In nearly all the Provinces it is true that those engaged in the development of what is, after all, next to agricultural land, the greatest of our natural and national resources, have not received from Provincial authorities encouragement and support of a kind commensurate with its importance as an actual and potential source of wealth. There is need for a change in the mental attitude of those in the seats of the mighty, whether in Ottawa, or in Provincial Legislatures, who have too long treated our mines as the Cinderella of our natural resources.

Canada's known and ascertained mineral wealth is huge. Her potential wealth of this character is possibly, judged by the standards to which we are accustomed, almost illimitable. It is well within the bounds of possibility that, ere long, this country will take undisputed pride of place as the world's greatest gold-producer, a position which Canada already holds in the case of nickel, asbestos and other minerals. The magnitude of Canada's mineral resources is only rivalled by their extent and variety.

But yet both Dominion and Provincial Governments have shown themselves insufficiently alive to the importance, in the national interests, of the adequate development of this source of wealth and to the difficulties of various kinds which beset those who are seeking, often under substantial handicaps, and with the certainty of heavy financial expenditures at present while future rewards are, more or less, problematical, to develop it. For, in practically every mining venture, the uncertainty attaching to the development stages is a factor as formidable as it is familiar.

We have referred, before now, to the notorious fact that it is necessary to import many lines of gold mining machinery and machine parts from the United States, for the reason that they are not manufactured in this country. Right here is where, in connection with the vexed question of the tariff, the Dominion Government can aid the mining operating industry without working hardship on those Canadian manufacturers of mining machinery, who, in their own lines of manufacture, are serving the industry well. Let them have adequate protection for their lines of manufacture, but let such lines of machinery and machine parts as they do not manufacture be admitted duty-free from the United States.

Further (also in connection with the tariff) there are two modes of dealing with many of our mineral resources—such as asbestos, for example. They can either be exported in their raw state to other countries, made into finished products and sold back to Canadians, in that form at hugely increased prices; or they can be made into finished products in this country and exported to other countries in that form. It is obvious that the latter mode is the one which is in the interests of the country at large. For (to take the case of asbestos) it would mean that the whole of the various processes of manufacture would be carried on in Canada, providing employment and creating business—and it is a significant fact that the value of the asbestos

which we export to the United States is merely in its crude form about a tenth of its value when it has been worked up there into asbestos products. It is in cases of this kind that the tariff can be so shaped as to foster national development.

Again, we have been compelled, more than once, to call attention to the Ontario Government's neglect to facilitate the expansion of the industries of the Northland of Ontario by its delay in granting rights to the Hollinger Consolidated Mines, Ltd., such as would allow the company to go ahead with its plans for increasing production. The Hollinger was ready to push on with its plans for power development—a work which would have resulted in the disbursement of a large amount of private capital and the employment of perhaps thousands of men, at a time when work and wages are urgently needed—but the Government delayed to grant the rights necessary to this projected industrial expansion.

What is wanted, in Dominion and Provincial Governments alike, is a more comprehensive understanding of the needs of the mining industry, both in large things and in small. With a new Government at Ottawa, is it too much to be hoped that it will seek to foster such an understanding and to coordinate its own activities and those of the Provincial Governments in aiding the mining industry of the country.

THE POWER SITUATION.

The gold mining industry at Porcupine, at the moment of writing, is still held in check by the inaction of the Ontario Government. Men who might be expected to help solve the problem are busily engaged in electioneering, and the serious responsibilities of office are apparently, with some of them, taking second place to the effort to put more farmers into legislative offices. Until after election day at least, the application for rights to develop power for Porcupine mines is to be ignored.

It might be supposed that the utilization of our water powers, would be considered in the best interests of the Province. It might be supposed that expansion of the gold mining industry with increased production and larger pay rolls, would seem to be so desirable that Ontario Cabinet Ministers would exert themselves to help in finding the desired power. Yet the attitude of Government appears to be that the water should continue to run to waste and that operators should be forced to develop their power from imported fuel.

This lack of attention to the needs of the mining industry, and disregard of the consequences of inaction, is difficult to understand. There may be different interests to satisfy in taking action, but that cannot be accepted as a satisfactory explanation of the Government's attitude.

Until there is a solution of the power problem the planned expansion of operations must be postponed. The mining companies, if not allowed to use available water power, will have to consider other sources of power. The most reasonable substitute will probably be oil, which can be advantageously used in special engines. The use of oil will help the companies to increase production in case the use of water power is not permitted. There is as yet no satisfactory explanation of the Government's attitude towards the mining industry and it may prove necessary to wait a few years for action. Meanwhile the companies will do well to consider other possible sources of fuel.

THE FORT NORMAN DISCOVERY.

It has previously been pointed out in these columns that the discovery of petroleum at Fort Norman is significant as a reminder that the unexplored areas of this country are liable to become the scenes of great industrial activity when their secrets are learned. Already the district, by reason of the oil discovery, has become a centre of interest, and its development will undoubtedly proceed much more rapidly than would have been the case, had the discovery not been made. Indeed, in the opening of the new route of travel to the North, the district is already reaping the first fruits of the operations of the Company which is responsible for the exploration of the western provinces and the north-west territories.

At the same time, in this matter, as in others, the course of not counting one's chickens before they are hatched may be heartily commended to sundry commentators on the discovery in question. As a recent issue of the Imperial Oil Review very pertinently points out, following on, and in consequence of, the discovery at Fort Norman, a good deal of loose talk was indulged in regarding the exploitation of the country's oil resources by large private enterprises at the expense of the public interest. "Some newspapers at once ear-marked the proceeds from the sale of Fort Norman petroleum which would accrue to the public treasury for the liquidation of the national debt."

"Now it is true that "Hope springs eternal in the human breast"—and often it takes little or no account of the delays that are inevitable before it can be realized. In this case, we are in hearty accord with the view expressed by the Imperial Oil Review to the effect that the discovery of the Fort Norman well meant only the begining of a long and costly experiment, upon the result of which, at best, success or failure was evenly balanced. What has now to be determined is the value of the Fort Norman field as a potential source of supply.

This work will take a long time. It involves great difficulties and necessitates heavy expenditures, before favorable results can certainly be shown. But it is work which is necessary in the national interests. And it would be well if those who have, before today, talked light-heartedly of vast benefits to accrue to the

public treasury from this discovery, were to reach some more accurate understanding of the magnitude of the task that yet lies ahead, of its difficulties and of its heavy cost.

GOLD AND THE EXCHANGE PROBLEM.

In the November 12th number of the "Mining Journal," London, Mr. H. Abbati advocates a free market in gold as a solution of the exchange problem. This would reduce the national debt in terms of gold, and increase revenue in terms of paper. Conditions for export would be much increased. Mr. Abbati argues that the reason why the value of gold has been subject to such wide fluctuation since the war is solely because it has been diluted with paper and credit as a substitute. Owing to the exigencies of the situation brought about by the war, huge gold debts have been contracted, to an extent far exceeding the amount of gold in the world. In fact, were there such a quantity of gold in the world, gold would then be so diminished in value as to be unsuitable as a standard. As it is, to cover up the insolvency of the debtors, legal restrictions have been put in the gold market, which practically means that it can only be handled by Governments; and the Governments, again, only handle it in such a manner as to cause them the least possible embarrassment towards their respective electors. The value of gold would very soon return to pre-war if there were a free market in gold, and if the various peoples of Europe, including England, realised how little, ultimately, the paper currencies will be worth.

A return to a sound basis for currency would make a demand for gold in England and pave the way for marketing goods in America. There being no market now in England for gold, the metal, instead of goods, is exported.

Commenting on Mr. Abbati's statements, the "Mining Journal" says editorially:

"We take it that the main distinction between conditions to-day and before the war is largely the absence of any international basis of values. Gold stocks are entirely immobilised. The world, being heavily in debt to the United States, cannot afford to buy gold from her, while Great Britain has set the fashion to the rest of the world by refusing to allow gold to be exported. As the gold is not used for currency here, this means that for the time being gold in the country is of no practical value. We have by this embargo on export, therefore, reversed what has been the trade policy of the country at any rate from the beginning of industrial times, and in doing so have for the time being stopped the operation of what was always described before the war as the automatic check on inflation or deflation—the "governor," as it was frequently termed, of fluctuating trade loads. Why, it may be asked, do we not revert to it? We have little doubt that Mr. Abbati is right when he attributes the cause to the reluctance of the authorities, Governmental and financial, to face the fact that for the purposes of the war we depreciated our currency. In the old days the Sovereigns of England and other European countries were wont to do this by debasing the metallic currency; in these days we have given up the metallic currency, and have produced the same result by diminishing the gold reserve against paper. What the real value of gold should be to-day it is imposible to say, the only standard we have is that of American currency. That, however, would appear to be too low, because gold mining in the United States cannot be carried on at a profit, while here the relation of the paper pound to the gold pound is a fluctuating one, governed almost entirely by the varying ratio between the paper pound and the dollar."

Such views as these are worthy of attention. They serve to remind us that those who are interested in gold mining must not sit idly by, while financial interests which have found it so difficult to find their way back to the gold standard are preparing the public mind to accept an experiment as a substitute for the real thing.

EDITORIAL NOTES.

The report of the Director of the United States Bureau of Mines, summarizing some of the work done during the past year shows that investigations that should prove very useful to the mining industry have been carried on. The report is a good example of what can be done by a well organized body of workers who are familiar with the problems of the industry. Research of this kind is, in our opinion, of very great value.

The meeting of the American Association for the Advancement of Science to be held in Toronto during the last few days of the year will bring to Canada a number of engineers and geologists. Meetings are being arranged for disenssion of many subjects and mining men will find some of the sessions of interest to them. The application of science to industry is kept well in mind by many of the members.

Interest in Kirkland Lake gold district has been given another impetus by the completion of the mill at the Ontario-Kirkland. This company has made good progress during the year.

Mr. C. A. Foster, who has been identified with the early history of several mining areas in Ontario is now engaged in making a mine in a new district. His new enterprise should be of special interest to the business men of Sault Ste. Marie. The development of a new area means much to the merchants as well as to the shareholders.

The Oil Industry of Canada

The history of the oil industry in Canada begins with the Indians, who in 1830 discovered layers of crude oil gathered on the top of the waters of Black Creek and Bear Creek, in Lambton, Canada West.

Production at that time consisted of spreading blankets over the surface of the waters carrying the oil and then squeezing it out into such containers as the Indians happened to have laying around. This product was known as "Medicamentum" and was a sure cure for everything from burns to bunions. Seneca oil or American Medical oil was a similar product discovered at Lake Seneca, N.Y., at about the same time.

It was not until 1859 that production of oil on a large scale began. In that year about 2,000 barrels were produced in Pennsylvania, which was sold at the staggering price of $20.00 per barrel.

But like all good things, "twenty dollar oil" could not last. Production increased so rapidly that four years later (1862) the total had reached the great amount of 1,796,712 barrels, while the price dropped from $20.00 per barrel to ten cents per barrel. This holds all records in price deflation of crude petroleum.

It was at this inopportune time that James Shaw made his big strike at Oil Springs. The well flowed 200 barrels per day, but owing to the lack of storage facilities most of the oil ran away into the creeks and ditches. Enterprising parties seeing an opportunity to benefit through salvage offered Mr. Shaw fifty cents per barrel for any of the lost oil they could save. However, Mr. Shaw was not at all interested in their offer, and told them so in the sulphuric vernacular of of the early oil period.

The First Oil Refineries.

A start was made to refine oil for illuminating purposes as early as 1862. William Spencer built a refinery at Woodstock, known as the Cedar Creek Oil Works, while J. H. Williams built another refinery at Hamilton. Mr. Spencer purchased lots 15 and 16, 2nd Con. Plympton, surveyed them and founded the town of Wyoming. He later joined forces with Mr. Williams, of Hamilton, and built a tie-road to Oil Springs.

The crude oil was transported in barrels by wagons from Oil Springs to Wyoming and thence shipped via the Great Western Railway to Woodstock and Hamilton for refining.

The process of refining crude petroleum was at that time a great secret to be guarded with utmost care. The refineries were fenced and a vigilant guard placed to "shoo off" all would-be pilferers of the secret.

The stills were made of cast iron of 15 to 20 barrel capacity, and had a solitary "goose-neck" leading to the condenser.

The treating process consisted of agitation by an agitator with a revolving paddle at the bottom. The washing with acid and water followed. Caustic soda was used to remove the acid.

This agitation and acid wash completed the process and the "refined" oil was barreled direct from the agitator.

The finished product was a fine amber-colored oil that would make any lamp chimney the same color in about twenty minutes, but it commanded the attractive price of $1.00 per gallon.

Notwithstanding the high price and the distinctly inferior qualities of the earlier refined oils, the demand continued to grow, and as it is typical of all oil men to move with the times, Mr. Spencer moved to London and greatly enlarged and improved his refinery. Herman Waterman was made a partner, and the firm of Spencer and Waterman launched out on their successful career. Many other refineries were built and great improvements were made in the processes of distillation and refining.

Important Discovery.

Mr. Spencer discovered that litharge would sweeten the oil and free it from some of the sulphur, thus greatly improving the quality of the oil. This process was accordingly adopted and the process sold to the other refineries as well.

Of the many refineries operating at London at the time, the largest were as follows:—

Greary Moncrieff & Co.
W. Spencer & Sons
F. A. Fitzgerald & Co.
Waterman Bros.
Duffield Bros.
T. D. & E. Hodgins.

These firms eventually amalgamated and operated under the name of The London Oil Refining Co.

In 1870 an European export business developed and many more refineries were built. The Silver Star Works was built in London by Englehart, Glugerheim & Co., at a cost of $200,000. This was regarded as an immense plant at that time and they carried on a large export business.

Buys Other Companies.

Business, however, took a downward turn, exports diminished, and general business declined. The Silver Star Works were brought by the London Oil Refinery Company, together with many others. The principal ones were:—J. L. Englehart & Co. Petrolia; John McMillan, Petrolia; John McDonald, Petrolia; Frank Ward, Wyoming; Woodward & Co, Petrolia; J. H. Fairbanks, Home Oil, Petrolia; Perkins & Gleeson, Petrolia; McMillan, Kittridge & Co., Petrolia; Millar Bros., London; Sir Melville Parker, Oakville; J. W. Sifton, Paris; W. of C. Oil Lands & Works, Petrolia; Producers Oil Company, Petrolia; Alex. Depper, Marthaville; Mutual Oil Company; Black Star Oil, Sarnia; Geo. Taylor, Wyoming; McKenzie & Sons, Wyoming; John Davis, Port Edward; John Baily, London; J. Robinson, London; Winnett Bros., London; Baltic Ref. Co., Hamilton; Petrolia Crude Oil, Petrolia; Consumers Oil Co., Petrolia; Ont. Carbon Oil Co., Petrolia.

Contrast.

1862.—First Oil Refinery received about 100 barrels of crude oil per week in barrel and distilled from it 20 to 25 per cent. of lamp oil and threw the balance away.

1921.—Imperial Oil Refinery at Sarnia receives about 10,000 barrels of crude oil per day by pipe line and turns out over 96 per cent. of it in gasoline, oils, waxes, greases, or over 100 articles of commerce.

With the development of refining, production of crude oil increased. In fact, it was overdone to such an extent that the crude oil supply greatly exceeded the market requirements. In 1886, the production of Canadian crude oil reached the million barrel mark

This reversal necessitated stern measures. A syndicate was formed to protect the refining interests. The refineries were leased, closed or given a fixed quota of oil to supply the market. Though this measure was successful in curtailing the output for a time, other refineries were built and other interests demanded recognition. Dissolution of the syndicate followed and over sixty leases were terminated.

The inevitable result was an upward shoot of production of refined oil similar to that of the production of crudes and an over supply was created. The prices of refined oil dropped from 35 cents per gallon to twelve cents, and from then on it was an open field. Business settled down to the "survival of the fittest."

Imperial Oil Limited Founded.

On September the 8th, 1880, the Imperial Oil Company was formed, composed of the following firms:—J. S. Englehart & Co., F. A. Fitzgerald & Co., W. Spencer & Sons., Waterman Bros., Geary, Minhennick & Co., T. D. & E. Hodgens, Walker & Smallman.

The paid-up capital was $500,000.00 and the officers were F. A. Fitzgerald, President, J. S. Englehart, Vice-President, W. M. Spencer, Secretary.

With the formation of Imperial Oil Limited, came greater improvements in manufacturing, as well as marketing petroleum products. Herman Frasch was engaged as chemist for the Company and fractional distillation was introduced.

The introduction of fractionation brought greater economy in production. It eliminated the great waste by recovering more products from petroleum.

The advent of the internal combustion engine created a market for naptha which had hitherto been a waste product. Likewise lubricants came more into prominence and as lubrication grew into a science, a greater variety of oil was demanded, thus enabling the refiners to utilize still more products from petroleum.

Steady Growth.

The demand for petroleum products grew apace until the Canadian refiners handled far more crude petroleum than the Canadian producers could supply. Crude oil had to be imported from the producers in the United States.

The Imperial Oil Company continued extending and increasing its business until in 1898 it was easily the largest oil refining Company in Canada.

Since then the development of the Company has continued.

From refineries covering from two to five acres and representing an investment of from $10,000 to $25,000.00 each, the oil industry in Canada has expanded until to-day it is represented by refineries covering 100 acres or more and requiring an investment of from $3,000,000 to $5,000,000 and more for one refinery alone. Where only one product was manufactured—kerosene or lamp oil—hundreds of different products are now recovered.

(IMPERIAL OIL REVIEW).

WISCONSIN-SKEAD.

Dewatering of the underground workings of the Wisconsin-Skead property is now under way, and the mining plant will again be in operation in a short time, following an idleness of about two years. Dr. Costello, one of the principals of the company, is directing the work of preparing the mine for operation. Cross-cutting to the veins was under way when work was suspended.

ONTARIO KIRKLAND GOLD MINES.

Ontario Kirkland Gold Mines, Limited, which started producing this week, has been financed almost entirely by Pennsylvania people. The company has an authorized capital of only $1,500,000, in shares of $1 par value. The officers are: president Frank Huth; vice-president, Wm. H. Meyer; secretary, W. A. Gordon; treasurer, Albert J. Bolton; manager, Ralph Hurd; directors, Walter E. Hurd, M. Y. Krauss and Wm. J. Yoell. The head office of the company is at Haileybury.

The property of the company is two claims comprising about 90 acres. The mine is about a half mile south of the townsite of Kirkland Lake. As Wright-Hargreaves Mine is directly north of the town and Lake Shore about a quarter mile west, adjoining Wright-Hargreaves, the Ontario-Kirkland is comparatively close to these other two producers. The Ontario-Kirkland has, however, developed its mine off what was considered the main ore zone of the camp. On the same zone are located the Hunton and Comfort, and probably the Canadian Kirkland, Highlands and other properties farther west.

Total underground development work at the Ontario-Kirkland totals about 5,000 feet. Of this about 3,000 feet is drifting, 940 feet shaft sinking and the balance cross-cutting. Levels have been established at 150, 300 and 450 feet. On two shafts, each down 470 feet, are complete mining plants. The main shaft, which was recently completed, is three compartments.

The mill's rated capacity is 100 tons a day.

Exposures of milling ore in the drifts show widths of from four to eight feet, assaying $8 to $28 to the ton. It is estimated that development work to date has placed in sight 100,000 tons of ore averaging $1,500,000. This tonnage is sufficient to keep the mill supplied for about three years. It is expected that the monthly production will be between $40,000 and $50,000.

Splendid housing accommodation for men has been built on the company's properties.

The mill has been erected on a natural mill site advantageously situated on a hill side near the new shaft. Many economies in operation have been effected due to the gravity flow of the ore and pulp through the mill. The plant is on improved lines, similar to those which have been successful in the treatment of Kirkland Lake ores.—The Northern Miner.

NEW MINING ASSOCIATION.

Mining men, prominent in the metallurgical industry of the Kootenays, formed an organization known as the Mining Association of Eastern British Columbia in Nelson last Friday.

Provisional officers and an executive committee were elected as follows:

President—R. Randolph Bruce, Invermere.

Vice-President—Clarence Cunningham, Alamo.

Secretary-Treasurer—W. H. Burgess, Kaslo.

Executive—S. S. Fowler, Riondel; Thos. W. Bingay, Trail; Major A. W. Davis, Nelson; J. P. McFadden, New Denver; W. T. McDowell, Ymir; Douglas Lay, Rossland; S. G. Blaylock, Trail.

President Bruce and President J. J. Warren of the Consolidated Mining and Smelting Company of Canada, Limited, will proceed to Victoria in a few days to interview the provincial government on the general mining situation, and on their return a general meeting will be called.

Some Rock Drilling Tests

By C. R. FORBES
(Consulting Mining Engineer)

During the past few years the question of rock drills, drill bits and drill steel have received much attention, and many improvements have been brought about, both in the design and in the use of rock drills and drilling equipment.

Among these improvements, the use of smaller changes in gage between the different steels has been one of the most important. With the old types of piston drill, gage changes of ¼ inch or more were often used, necessitating the use of steel of from 3 to 3½ inch diameter to start when deep holes were to be drilled. As the work of drilling varies almost directly with the quantity of material removed, the use of these large sizes of steel resulted in a great loss of time and energy. Until the development of the Carr bit and the modern double-taper bits, gage changes less than ⅛ inch were deemed impracticable. At the present time many companies throughout the United States are successfully using gage changes of 1-16 inch, and in some cases changes of only 1-32 inch are used. Although these very small changes require great care and accuracy on the part of the drill sharpener, both in forging and gaging the steels, and in proper heat treatment, still the cost of this extra work in the drill shop is more than offset by the increased efficiency of the drilling machines.

Another improvement in drilling practice that has been brought about recently by several companies is the use of 1 inch steel in place of 1¼ inch in the large mounted hammer drills. In the Michigan copper mining district 1 inch hollow hexagon steel has been used for some time in place of 1¼ inch round steel. This steel is used in drills with anvil block chucks requiring no collar or lug on the steel. The Copper Queen mine of the Phelps Dodge Corporation has lately standardized on 1-inch round lugged steel for all machines. The advantage of the smaller cross-section consists in the saving in steel, faster drilling speed, and saving in labor on the part of the miner in handling the lighter steel.

In order to find out whether or not these improvements were applicable in the Missouri-Kansas-Oklahoma districts, the Mississippi Valley Experiment Station of the Bureau of Mines, working in co-operation with the Missouri School of Mines and Metallurgy, conducted a series of experiments extending over a period of four months, beginning May 1, 1921.

The tests were made by I. F. and J. T. Hodges, senior students from the Missouri School of Mines and Metallurgy, who had considerable practical experience as miners. The work was done in the Bluebird mine of the O. M. Bilharz Mining Co., near Commerce, Oklahoma, and was under the immediate supervision of F. H. Gartung, superintendent for that company.

The kind of data recorded in the tests is shown by the following headings from a specimen data sheet: Length of Steel; Distance Drilled; Time Drilling in; Time Drilling out; Speed of Drilling in minutes; Gage at start, at finish, and loss; Air Pressure; Character of Ground; Condition of Used Bit; Remarks.

The first series of tests was made to find out the minimum change of gage practicable for conditions in this district when using the standard 1¼ inch steel.

A study of the practice in the district indicated that gage changes of from ⅛ to ¼ inch were commonly used. Drilling is done almost universally with the mounted type of hammer drills operated by two men. One and one-quarter inch round hollow steel is used with 24-inch changes in steel lengths.

In order to insure perfect uniformity in the hardness of the bits, a Sullivan oil forge with pyrometer control was used for heating the steel. The critical temperature of the steel was determined, and all bits were hardened by plunging from this temperature. The bits were forged on a Sullivan sharpener. Two types of bits were used, the Sullivan double arc and the cross-bit, both having the double taper. Bits were forged and hardened by the mine blacksmith and were exceptionally well made and uniformly hardened.

The results of this first series of tests showed an average gage loss of 3-32 of an inch for a 24-inch change of steel. In these tests 64 holes, varying in depth from 3 feet to 12 feet, and totaling 303.5 feet, were drilled. Three different makes of drills were used. Air pressures of from 60 to 85 lbs. per square inch were used in drilling.

These results indicated that changes smaller than ⅛ inch would be impracticable. However, to verify this, three sets of 1¼-inch steel were made up, using 1-16 inch drop in gage. The results of these tests indicated that it was possible to use the 1-16 inch drop in gage in loose water-course ground; but if a hard boulder or hard ground was encountered the gage wore off very quickly and caused trouble in changing to the next steel.

The conclusion from all these tests was that for conditions in this district, when using 1¼ inch hollow steel and a 24-inch change in steel length a gage of ⅛ inch is the smallest practicable. Larger changes than ⅛ inch are unnecessary, as in no case was the loss greater than ⅛ inch. Under these conditions a starter of 2½ inch diameter will permit a 16-foot hole to be bottomed with a steel of 1⅝ inch gage. The 24-inch change in length of steel in general use in the district is quite satisfactory, as in most ground the steel does not become too dull for efficient drilling in penetrating that distance.

The second series of tests consisted in using 1-inch steel in place of 1¼-inch. In order to conduct these tests it was necessary to equip one of the standard drills with a special chuck for 1-inch steel. Through the courtesy of the Ingersoll-Rand Company a special anvil-block chuck for 1-inch hexagonal steel was provided. A simple steel retainer was made at a local shop and attached to the drill. The steels were collared similarly to "jack hammer" steels. The 1-inch hollow hexagon steel was first tried, because it was the only 1-inch steel available. The use of lugless or collarless steel with anvil block chucks was thought to be impracticable for this district. The rock is mostly chert or cherty sale. The chert is often much fractured, and in some cases along the water courses is in the form of a loosely cemented breccia. Also the chert

varies in hardness. That which is known as the primary, or light-colored chert, is comparatively soft and brittle, and is called "shelly flint" by the miners. The secondary, or dark-colored, chert, is very hard. When drilling a hole which penetrates both kinds of chert the "shelly flint" will shell off into the hole and cause much trouble in removing the steel. Along the water-courses small cavities are common. These interfere greatly with drilling, causing a loss of water and accumulation of cuttings behind the bit. Another source of trouble is the dropping of small flint pebbles into the hole behind the bit. These pebbles wedge themselves between the steel and the rock and often cause great difficulty in removing the steel from the hole. A miner frequently spends a great deal more time backing the steel out of the hole than in "drilling in."

In view of these conditions it was decided that 1-inch round lugged steel would be the best section to use. However, as no 1-inch round steel was on hand and sharpener parts were not available for sharpening the 1-inch round steel it was decided to use 1-inch hollow hexagon, which was on hand and could be used immediately. In the meantime parts for the sharpener and a chuck for 1-inch round steel were ordered from the Sullivan Machinery Company.

The results of the tests with 1-inch hexagon steel were most encouraging. Nineteen holes from 4 feet to 10 feet in depth were drilled, with a total depth of 96.9 feet.

The longest steel available for these tests was 10 feet. The starters were made 1¾ inch diameter and 1-16 inch gage changes, with 2 feet changes in steel lengths were used. The drilling was done in different kinds of ground, including the hard flint, water-course, and fractured ground. The drilling speed as compared to previous results with 1¼ inch steel was increased about 90 per cent. The great advantage of the small steel, however, seemed to be in the ease with which the steel could be removed from the hole. This fact was evident in every test. The 1-16 inch drop in gage was sufficient except in very hard ground, where it was necessary to use two steels of the same length in drilling the 24-inch change. The only disadvantage noted with this steel was in cleaning and loading the holes. In the fractured ground, where the sides of the holes are rough, it was sometimes quite difficult to get the powder into the bottom of the holes.

The conclusion from the results of 1-inch hexagon steel was that holes up to 10 feet in length can be drilled faster and with much less exertion using 1-inch steel than when using 1—1¼-inch steel.

After considerable delay a quantity of 1-inch round steel was obtained from New York by express. Thirty-eight holes, varying in depth from 4 feet to 16 feet, and having a total depth of 315.7 feet, were drilled with the 1-inch round steel. The results obtained from this steel were not so good as with the hexagon steel. The chief reason for this was on account of the quality of the steel itself, which was of low carbon content and could not be made hard enough to stand up to the work. The most careful heat-treated bits wore down in a few inches of drilling. The drilling speed obtained with the 1-inch round steel was no greater than with 1¼-inch steel. In making up this steel a 1 15-16 inch starter was used with 1-16 inch gage drops, making a 16-feet steel of 1¼-inch gage. Several 16-feet holes were drilled in very bad water-course ground and much trouble was experienced in removing the steel and in cleaning and loading the holes after the steel was removed. However, it may be stated that in this connection that much trouble would also have been experienced in the same ground with 1¼-inch steel.

In all the tests on 1-inch steel, both with hexagon and round, there was practically no steel breakage. Also there was apparently no greater wear on the machine hammer than with the 1¼-inch steel.

The possibility of using smaller steel in this district is complicated by the method of mining which requires many deep holes to be drilled, and also by the character of the ground.

The use of deep holes necessitates large starting bits. With 1-inch steel a bit larger than 2-inch diameter is undesirable. This means that a 16-foot hole must be collared with a bit not to exceed 2-inch diameter, which makes it more difficult to keep the machine lined up and also causes more trouble in cleaning and loading than where holes are collared with larger starters. This is especially true in the "cavey" water-course ground. The results of these tests, which are still being continued, should show beyond question the possibilities of 1-inch steel in this district. Since the completion of these experiments at the Blue Bird Mine the Bilharz Company has continued the tests, using 1-inch hexagon steel with 1-inch round lugged shanks and are successfully drilling and loading holes up to 16 feet in depth.

The conclusions from all tests are as follows: 1. One-eighth-inch gage changes and 24-inch changes in steel lengths are best for conditions in this, the Tri-State, district when using 1¼-inch steel. 2. One-inch steel can be used successfully with the large hammer drills for drilling holes up to 10 feet in depth, at a considerable saving in time and energy on the part of the miner. Gage changes of 1-16 inch and changes in steel lengths of 24-inch can be used with 1-inch steel.—U. S. Bureau of Mines, Reports of Investigations.

MR. A. D. KEENE, ELECTRIC FURNACE ENGINEER.

Mr. A. D. Keene, Electric Furnace Engineer of the General Electric Company, Schenectady Works, is now connected with the Pittsburg Electric Furnace Corporation as engineer on electric furnace designs and applications in the steel and metal industries, where his long practical experience in the design of various electric furnaces and ovens should prove highly valuable. His joining with the Lectromelt Furnace forces indicates a broadening out of the Lectromelt Furnace line, which has heretofore been confined to melting and refining furnaces for steel, iron and brass, bronze and ferro alloys. Mr. Keene has moved his residence from Schenectady to Pittsburg.

BEAVER STAYS CLOSED.

There can be little doubt that the Beaver mine will remain closed for the winter. The management are satisfied that it would not be in the best interests of the company to reopen at this time and will not likely do so until spring at the earliest. It is hoped that next summer will bring higher silver prices and lower operating costs.

THE POUCE COUPE OIL FIELD

By E. L. CHICANOT

The oil strike and subsequent development of the Fort Norman field had the effect of largely overshadowing the search for oil in other sections of the West and North, where indications were just as favorable and the search just as zealously and strenuously prosecuted. The ceaseless influx and extensive staking about the find occupied all attention, to the exclusion of just as significant developments elsewhere, and it is only recently that the public has come to know anything about the developments of the Imperial Oil Company in the Pouce Coupe field. Though it has received comparatively brief and limited attention from the outside world, this is probably the most promising field at the present time, and the area has for months seethed with expectancy and thrilled in eager anticipation.

Despite the reports which have dribbled down lately that oil had been struck recently in the well being drilled there, the Imperial Oil Company gives definite assurance that this is not the case, and the reports would seem to have emanated from men on the spot acting in the very best of faith, but lacking the necessary technical knowledge. Little news, as a matter of fact, is permitted to get out. The premises for miles around the drilling are being zealously guarded against visitors, and no information is being given out by employees. All company work in the district is hedged about with so much secrecy, and it is so difficult to elicit reliable information, that correspondents have been led to draw their own conclusions, with the result that they have somewhat exaggerated the situation.

Certain it is that wet gas of an exceptionally heavy pressure has been encountered and that gasoline is being forced by the tremendous pressure through joints in the pipe. There are the very best indications of an oil strike, but the working season concludes without this search being satisfied. The appearance of gasoline has undoubtedly led to the too rapid conclusion that oil had been reached, but the explanation of this is the rich content of the gas.

The history of the well is briefly as follows. On September 26th a heavy flow of wet gas was struck by the drillers of the Imperial Oil Company at a depth of 1,650 feet, the volume of which was estimated at two million feet per day. When the flow was first struck in the boring operations, oil, sand, and pebbles were thrown high into the air and a vapor column could be seen for some considerable distance for a long time afterward. Drilling was of necessity discontinued, and it was apparently the intention of the company to reduce the hole, as indicated in the arrival on the spot shortly afterward of a quantity of three-inch casing. Drilling had been commenced with a 21-inch bore and was twice reduced in the course of the operation.

As the result of only fifteen minutes of actual drilling after the strike, the flow of gas increased from two million to eight million feet per day, and drilling was again suspended. Further development was undecided for a while to await the judgment of officials of the company. Either drilling on the well was to be resumed or the well capped pending the sinking of other holes in the vicinity and utilizing the discovered gas as fuel. It was believed that the latter would be the plan followed, which was supported by the arrival on the scene of a capping apparatus weighing over a thousand pounds. Now, however, the company declares its intention of cutting off the flow of gas, if possible, and resuming drilling on the well to a distance of three thousand feet, if necessary, in their oil search.

Before the beginning of November, the well was successfully capped, and this was followed by the appearance of gasoline, which gave rise to further rumors. The pressure on the well is said to be greater than has ever before been encountered in the history of drilling. When the valve is opened slightly the roar can be heard for miles, and it is necessary for the crew to be provided with protection against concussion. Though at the beginning of November there were no indications of winter, and prospectors in the vicinity were working on mineral claims, and some ploughing was in progress, the last word has been written in the oil search at Pouce Coupe for the season, and the developments of the spring can only be anticipated. All on the spot are, however, most optimistic, and engineers consider the chances of an oil strike highly probable.

According to word received from Pouce Coupe it has not been decided whether the flow is a vertical or lateral seepage, and a considerable amount of importance attaches to this point. If it were lateral it would indicate that it was being forced from a body of oil in the vicinity which might not necessarily be tapped by the present hole. On the other hand, if the flow were vertical, it is regarded as a certainty that the present well will be brought in. An authority in the district has advanced the opinion that the anticline has been tapped at its apex or crest, this accounting for the terrific amount of gas encountered, the latter naturally being stored in the highest point of the structure. The same authority believes that piercing the structure below the gas line would result in an oil gusher, and that to sink such holes lower on the anticline is the company's intention.

Oil was actually encountered in the drilling in small bodies at several horizons in this hole. A lateral seepage was struck at a depth of less than two hundred feet and was cased off. Several unimportant pockets of oil were met with between this horizon and that at which the present seepage was encountered. Work has been pressed as intensely as possible on the well, the crew working in two shifts of twelve hours each, and making as high as fifteen feet per day.

At the present time, while there is no foundation for the rumor that oil has already been struck, there is optimism of the well proving its worth when the opening of spring makes general activity possible again. Certain it is that the Imperial Oil Company intends extending its operations in the vicinity, as is evidenced by the quantities of supplies and equipment arriving in the district over the Edmonton, Dunvegan and British Columbia railway. Arrangements are made for a heavy freighting program during the winter months. Large tracts in the vicinity have been secured recently by purchase and lease, and there is unquestionably great development work to come at the hands of other corporations than the Imperial Oil Company. Though the summer's operations have not disclosed the precious fluid, there is every reason for optimism in the future of the Pouce Coupe area.

A POSSIBLE USE FOR SILVER.

By J. A. McRAE.

Again there is hope for bi-metallism, and again the silver miners of the world are coming to believe the metal which they produce will figure conspicuously in a solution of the financial problems of the nations.

"Repudiation" of financial obligations has been suggested by financial experts of high standing, but the power of suggestion in this instance may lose much of its force owing to such a procedure being foreign to recognized business principles and a shock to the pride of the British Empire.

The wholesale production of paper currency without adequate metallic backing has rendered all but impossible an adjustment of exchange rates between the trading nations of the world. The future earnings of all the people of nearly every country has been mortgaged for the next several decades, and the grandsons of the present generation will pay toll to collectors who will be part of their inheritance.

Gold is the only metal with a fixed value. The metal does not exist in quantities sufficiently large to lend a stable value to the great sheaves of paper now in circulation. As a consequence of this, rates of exchange may never become adjusted, and the debts of many nations may actually go unpaid, unless or until such time as some arrangement has been made for adding to the quantity of metal of fixed value.

It is inevitable that a solution will be found. The law of survival dictates that it must. It is also evident that the greatest promise of a solution lies in an international discussion of the problem, and that the whole world should "take stock" of its gold supply, which would be quite easy, and to also take stock of its silver — which would be comparatively difficult.

Out of the Disarmament Conference at Washington may come a better understanding of the financial situation of the world. As long as the nations of the earth maintain great battlefields, and so long as each country tolerates the clank of the sword, there could never come a solution of the monetary problems which are gnawing at the foundation of present day commerce. Should the Disarmament Conference decide definitely to minimise the construction of instruments of war, and should a joint agreement between the nations of the earth thereby offer to the world the fuller benefits of the energy of men, then it is only reasonable to believe that a "Financial Conference" should immediately follow.

Assurance that the countries of the world are determined to work in concert would be a basis upon which to attack the financial problems. A fixed value for silver in a ratio of 16 ounces of silver to 1 ounce of gold would greatly swell the amount of metallic backing of paper currency. This would constitute a second step, and would probably be sufficient to enable Great Britain to quickly place her currency at par. It would give to other European nations a substantial boost along the road to financial stability. In cases where even this additional metal of standard value would fall away short of bringing currency to par, there would probably follow a general liquidation of the excess supply of paper. That is to say, that where the currency of a country figured at a discount of 20 per cent. the general scheme of re-adjustment would be to immediately "fix" the value of paper currency at about four-fifths of its original value to issue new notes of the full value, but of a new design, for which only four of the new would be issued for five of what are at present in circulation. This scheme of adjustment, as in the case of Russia, for instance, would have to be carried to great extremes, and an investigation might reveal that a new issue of notes of "real" value could not be exchanged for those now in circulation on a basis of less than thousands of the old for one of the new.

Just what will be done at Washington will only be revealed as the Conference proceeds, but it would be a misfortune were the council of the nations to terminate without taking into account the monetary status of the world as a whole. This question is of paramount importance, second, perhaps, to the end of great wars. The normal movement of commerce is essential to progress, and this cannot be achieved under conditions where great uncertainty exists as to the solvency of trading countries.

In January, 1920, the price of commercial silver averaged $1.32¾ per ounce. At the closing month of 1920 it averaged only 64¾ cents per ounce. In March, 1921, it had declined to an average of 56 cents per ounce. Since that time it has been rising gradually month by month, until during October it reached an average price of 71 cents an ounce.

Whether or not the present strength in quotations for silver is a reflection of expected action at Washington cannot be determined at this early date. At any rate, it is interesting to keep in mind that to adopt bi-metallism on a basis of 16 ounces of silver to 1 ounce of gold would be to fix the price of silver at $1.29 per ounce. It is not improbable that this may comprise a part of the solution of the world's monetary trouble.

BOOK REVIEW

FIRST AID AND RESCUE WORK IN MINING. By Louis G. Irvine. Published in Johannesburg by the South Africa Red Cross Society. For sale by Mining and Scientific Press, San Francisco. Price $2.

This little book is designed to meet the need for First Aid instruction in mining. A general course in First Aid work is the subject of the Part I. The second part of the book deals with the special requirements of "First Aid in Mining." The author, Dr. L. G. Irvine, of Johannesburg, is well known for his work on miners' phthisis and the treatment of poisoning on nitrous fumes. Dr. J. C. Haldane in a prefatory note recommends the book highly. A large part of the volume deals with accidents due to poisonous or asphyxiating gases in mines, and with the use of rescue apparatus in connection with these emergencies. Among the subjects dealt with are: Treatment of accidents underground, transport of injured underground, accidents at reduction works on gold mines, cyanide poisoning, gaseous impurities in mine air and their effects, gas poisoning from the fumes of explosives, accidents in coal mines, use of rescue apparatus in coal mines.

DAVIDSON LOCATES VEIN.

According to information received from the mine by F. C. Sutherland & Co., development work at the 600 ft. level of the Davidson mine has resulted in finding good ore. Faulting had made necessary considerable work in picking up the vein. The company has about fifty men at work.

Copper's Importance in Domestic Commerce

An Officer of the Anaconda Copper Company, Greatest of All Copper Miners, Has the Following Interesting Article in "Iron Ore" of Ishpeming, Mich., Copper and its Development.

When the Santa Maria arrived off the coast of Honduras, Columbus captured a native canoe, and among other things it contained a number of copper hatchets. After reaching a point near Panama, he wrote a report to his sovereign and in mentioning the incident, spoke of these and other excellent examples of the coppersmith's art, adding that he believed the country contained great mines of copper.

Almost from that day forward, the mining of copper ores and the fabrication of copper metal have been important factors in the industrial and economic life of our country.

Early American historians all comment on the extensive use of copper by the native Indians and their amazing cunning in making domestic utensils as well as ornaments and implements of war. With such evidences of the use of copper about them and in view of the extensive use of the metal for domestic purposes in Europe, it was quite natural that the early colonists should adapt copper to their domestic needs. Thus we find the art of working copper to be among the first of the major industries to be developed in the Colonies.

In 1645, Joseph Jenks, a native of Hammersmith, near London, came to Massachusetts as principal workman and machinist for John Winthrop, Jr., and he deserves to be held in perpetual remembrance in American history as being the first founder who worked in copper and iron on the Western continent. Three years later Governor Endicott discovered copper deposits and brought smelters and refiners from Sweden and Germany.

Rapid Development of Copper Industry.

With the discovery of large copper deposits in New Jersey, Pennsylvania and Virginia, and the establishment of rolling mills in Boston, New York and Baltimore the development of the industry was rapid and in the middle of the last century we find copper or its alloys in general use for cooking utensils, roofing, ornamental ware, and a thousand other uses ranging from the manufacture of pins to the sheathing of ships. The copper-smith was as necessary to community life as the blacksmith. Except for that part of the country's production which was exported, the entire supply was used for purposes which we may broadly term domestic.

With the advent of the great era of electrical development, the demand for copper jumped enormously The production of the country was totally inadequate, the price rose rapidly and it became increasingly difficult to secure copper at a price which made possible its use for domestic purposes. Great new copper deposits were discovered, new mines were opened up, improved mining and smelting methods were developed, but still production was inadequate to meet demands.

The situation was further complicated by a series of wars and the consequent demand for copper for munition purposes; the development of the automobile industry and the great extension of interurban electric service. This enormous demand for copper resulted in an increase of production of 1,600,000,000 pounds per annum in ten years.

With the coming of the World War, the demand for copper became so great that its use in all but essential industries was expressly prohibited. Manufacturers were forced to cut out copper wherever possible and the use of the metal for domestic purposes was practically discontinued.

Changed Character of Copper Markets.

During this ten-year period when practically the entire copper supply was being absorbed in the development of new industries the old established markets were entirely neglected and hundreds of substitutes were placed on the market, claiming all the virtues of copper, and selling at a considerably lower price. Intensive advertising and intelligent sales promotion work resulted in the successful marketing of these substitutes notably in the roofing material field. The kitchen utensil industry also suffered.

In 1909 aluminium utensils were practically unknown. An effort had been made to market them some years previous but it had been entirely unsuccessful, so much so that aluminium was commonly known among retail hardware dealers as "lemon metal." The absence of competition in copper stimulated manufacturers of aluminum to greater effort and by improving their produce and an aggressive campaign of publicity, the use of aluminum kitchen utensils has increased by leaps and bounds until today 50 per cent of the kitchen utensils used in this country are made of aluminum, while less than 6 per cent are of copper.

In 1912 the average amount of copper used in automobiles of American manufacture was approximately 200 pounds per car. Today the average is less than 30 pounds per car. In 1914 a large manufacturer of screws, nuts, bolts, etc., in this country, consumed 10,000,000 pounds of brass. Last year they used less than 3,000,000 pounds.

The superiority of brass pipe, especially for hot water supply, is unquestioned, yet today brass represents only a small percentage of the total outlay for plumbing, even in our finest buildings. The plumbing in the Commodore Hotel in New York cost $90,000, of which only $3,150 represents brass pipe. The plumbing in the Woolworth building cost $450,000, of which only $32,400 went for brass pipe.

I will not dwell on the folly of permitting the preposterous claims of substitutes to go unchallenged for so many years, or the results of the apathy of the industry in the face of bold and aggressive competition. We are now aroused and fully determined that copper shall no longer suffer from public ignorance of the merits of the metal and its outstanding superiority in practically every field.

In no one industry perhaps has copper and brass lost so heavily as in building, yet most architects prefer to specify copper and brass as a matter of professional pride. A recent canvass of architects in and around New York developed the fact that 137 out 150 interviewed recommended copper for flashing and downspouts, and 128 recommended the exclusive use of brass pipe. Architects generally would gladly use copper and brass if prospective builders understood the rare

and exclusive qualities of the metals and would be willing to bear the extra expense.

Sheet copper is the best roofing material known, being very light, obsolutely impervious to the action of the elements, and practically everlasting. It is capable of being laid flat or being worked to any curve, and after being in use a short time it takes on a most attractive color, which harmonizes with practically all building materials. The first cost of copper roofing is greater than that of some other materials, but over a period of years copper with practically no maintenance cost, is considerably less expensive than any other material, and if a copper roof is properly erected it should last practically forever.

There are thousands of examples of copper roofs in service in all parts of the world. Nagoya Temple in Japan was roofed with copper 510 years ago, and is to-day in perfect condition and its many gabled roofs covered with the green patina of age have taken on added beauty every year. The dome of the State House in Boston was roofed with copper in 1831, and is still in excellent condition after 90 years exposure to the rigors of the New England climate. Christ Church, Philadelphia, has a copper roof laid in 1838 and I was recently informed that there is every reason to believe that the roof is good for another 100 years at least.

Copper Roofing Gives Unusual Service.

There are hundreds of less conspicuous examples of the wisdom of roofing with copper in the older sections of the country. Yet copper is rarely specified to-day because of a slightly higher initial cost which is saved many times over, even in the first few years of service.

For other roofing purposes such as flashing, gutters and rain conductors, copper is unequalled. On the Chew mansion in Germantown, Pa., one of the conductors bears the date of 1798.

It has been estimated that an average of 400 feet of gutter and conductor pipe are used on the typical American dwelling. Made of copper, it would cost less than $200 — a small item in the total cost of building a home—yet over 90 per cent of the spouting used is made of galvanized iron, which must be replaced at intervals of not over five years, while copper lasts a lifetime. The cost of erecting copper and galvanized iron is substantially the same, and the difference in initial cost is absorbed before the first replacement of galvanized iron is completed.

The use of copper in shipbuilding is as old as the industry itself. The ancients used it extensively and modern ingenuity has devised no better. Paul Revere sheathed the sides of the "Constitution" with copper in 1803, and the old "Granite State," having completed 75 years of service in the American navy, is now about to be burned to the water's edge in order that the charred hulk may be stripped of a copper bottom and the copper spikes in her hull reclaimed.

Lightning conductors, which we owe to the genius of Franklin, have been given an evil reputation by the machinations of fakirs and confidence men. Yet, the fire losses of this country due to lightning are enormous. The Department of Agriculture is constantly urging the use of lightning conductors, and fire insurance companies allow reduced premium rates on buildings so protected. But this great industry has been allowed to languish and become the prey of shysters. Copper as the premier conductor of electricity is the logical lightning conductor.

What copper and brass need is publicity. If you will pardon the colloquialism, we should "tell the world."

Where resistance to corrosion, easy handling of expansion and contraction, absence of upkeep expense and long life are to be desired, copper is supreme. My purpose is not to detract from the merits of other metals — all have their uses — but there are certain fields in which copper excels, and we intend to do all in our power to restore the metal to its former position of dominance.

Superiority of Copper Cooking Utensils.

In the kitchen utensil field, copper has marked points of superiority. In heat conductivity it is vastly superior to aluminium. In a copper utensil, food is cooked uniformly on the bottom and sides of the vessel. Fats and grease are not absorbed, and consequently it is easy to keep the utensil clean. Food flavors are retained, and in spite of certain minor handicaps such as the need of occasional retinning, copper utensils are and have always been the choice of the world's greatest cooks.

If the home builder knows that by using brass pipe his plumbing troubles are solved he will not hesitate to spend a few additional dollars to insure himself this comfort. Brass and bronze hardware can always compete successfully with plated steel substitutes if the prospecting purchaser knows that brass and bronze will outlive the building itself, and all that stands between steel and rust is a thin veneer.

The automobile industry will return to brass when the buying public is taught to demand quality where it cannot be seen, but counts the most. Copper roofing can be revived if the merits of copper are known. Brass plated screws can no longer pose as solid brass if the consumer is taught to demand the best.

Electric expansion and a revival of export trade will probably bring back a normal demand. But copper must get back into domestic commerce if the industry is to be established and protected against constantly recurring overproduction.

Let us revive the latent interest of the public in copper, and restore the metal to its rightful place as an important factor in the domestic life of the country.

UNION MINING CORPORATION.

Plans have been made for a more or less extensive diamond drilling campaign on the Union Mining Corporation property in Whitesides township, about 30 miles south-west of the producing area of Porcupine. The shaft is down 300 feet with lateral workings at 150 and 300-foot levels. The diamond drilling work is to be undertaken to determine the values of the downward continuations of the veins being worked on at present. H. W. Winton, of Chicago, president of the corporation, recently paid a visit to the property in connection with the work.

NEW MONEL METAL PLANT.

Contracts are confirmed for an International Nickel Co. monel metal plant at Huntington, W. Va. There will be 24, 20, 14, 10 and 9-in. mills, 6 x 30 in. bloom shear, No. 3 lever shear, 126, 141 and 155-in. squaring shears, Nos. 1, 2 and 3 vertical bar shears, annealing furnace charger, roll lathes, etc.

ACTIVITIES OF THE U. S. BUREAU OF MINES

Some American Researches in Aid of the Mining Industry.

Investigations conducted by the United States Bureau of Mines in the course of a special effort to aid the mineral industries to re-establish themselves on a safe business basis to meet the renewed foreign competition and the changed conditions of supply and demand of the post-war period point the way to the possible saving of vast sums through the application of improved methods in the production of various mineral materials, according to H. Foster Bain, Director, in his annual report, just made to the Secretary of the Interior.

Oil Losses by Evaporation.

An investigation of losses of crude oil through evaporation in storage and in transportation, conducted during the year by the bureau, disclosed losses of startling magnitude. It was found that in the few day in which crude oil is stored on the lease before being taken by the pipeline, the aggregate loss per year from evaporation amounts to about 122,000,000 gallons of gasoline in the Mid-Continent field alone. This has a value, at 22 cents per gallon, of $26,840,000, and represents about 3 per cent of the total gasoline produced in the United States from all fields and all sources. The bureau found that a large per cent of this loss could be prevented by the use of efficient equipment.

Gasoline from Still Vapors

The Bureau of Mines has pointed out the considerable losses which have resulted from the failure of many refineries to recover gasoline from uncondensed still vapors. The significance of this investigation is shown by the fact that one refinery in the Mid-Continent field is now recovering from still vapors approximately 400 barrels of gasoline daily that before the installation of this equipment was either lost or burned as fuel under the boilers and stills. The value of fractionating towers at petroleum refineries, by means of which some companies have increased the yield of gasoline from crude oil by as much as 5 per cent or 16 2-3 per cent of the total gasoline yield, has been demonstrated.

Large quantities of gas are now being wasted in the Osage Nation in Oklahoma because of low-pressure conditions, and the Bureau of Mines is investigating the feasibility of utilizing this waste gas by the use of low-pressure burners for oil-fire boilers. The demand of the export market for "sweet" gasoline led to the development of a process for treating gasoline to remove the objectionable sulphur compounds, by which treatment some grades of American gasoline heretofore objectionable were made suitable for export.

New Process for Cracking Heavy Oils

Under the arrangement by which supervision of the drilling and production of oil and gas on the public lands is vested in the Bureau of Mines, the bureau has supervision of about 100 producing oil properties which are producing at the rate of about 12,000,000 barrels of oil per annum. Even at the present reduced price of oil, the Government royalty from this should total perhaps $2,000,000 per annum. A special process, devised at the San Francisco station of the bureau, for cracking heavy oils and tars promises the recovery of large yields of gasoline and other lighter products, hitherto regarded as unrecoverable. Investigations made by the bureau in Colorado and Utah indicate that the oil-shale deposits of the Rocky Mountain states contain a potential fuel supply of almost unequaled importance.

Helium Investigations.

The experimental helium plant at Petrolia, Texas, conducted under the authority of the Army and Navy Helium Board, was in operation during the year at various times, and helium was produced for short periods. A study of the practicability of storing this rare and non-inflammable gas in mine workings was made at the bureau's experimental coal mine at Bruceton, Pa. At the cryogenic or low-temperature laboratory in Washington, D. C., liquid air in quantity is now being produced. The primary object of this laboratory is to investigate gases and liquids at low temperatures, with special reference to the separation of helium from natural gas. Field investigations of possible supplies of helium in natural gas were completed during the year in every known gas field in the United States having been tested. Results were markedly successful, as they have shown that this country contains the largest supply of helium-bearing natural gas in the world.

Saving Aluminum.

An investigation of scrap losses in aluminum-alloy foundry practice showed that the annual losses in the United States amount to $1,200,000, and that universal adoption of methods recommended by the Bureau of Mines would probably result in a saving of about $600,000 per annum. Melting losses in this industry, which are largely preventable, aggregate about $3,000,000 yearly.

Collection of Radium.

A new method was devised to simplify the collection of radium emanation from radium salts. Experiments are now in progress to perfect the process and to develop apparatus that can be recommended for public use in laboratories and hospitals.

Coal Washing

As about one-quarter of the bituminous coal produced in the United States is used in industrial power plants, the waste of unburned coal and coke in the ashes from boiler plants has been investigated by the bureau. It has been possible to recover the greater part of the unburned fuel by washing the ashes on a concentrating table. As the result of a study of coal-washing problems in the State of Washington, one mine has built a table washing plant to treat a pile of refuse amounting to more than one million tons, estimated to contain 200,000 tons of recoverable coal of coking quality.

Explosives

The bureau conducted studies regarding the use of liquid oxygen as an explosive. In co-operation with the Department of Agriculture an investigation was made of the use of cellulose from corn cobs in the manufacture of dynamite. Investigations were conducted to determine the best and safest conditions for the industrial use of 13,000,000 pounds of picric acid, held as a surplus by the War Department. During the year the bureau called attention to the danger in using certain low-grade foreign detonators which had been coming into the country in large numbers.

Gas Masks.

A universal gas mask has been developed by the bureau for protecting the wearer against all poison

ous gas not exceeding 2 or 3 per cent concentration in air where a safety lamp will burn. A fireman's gas mask has also been developed. A small gas mask for the use of train crews in railroad tunnels was devised. Investigations made in connection with the problem of ventilation in vehicular tunnels showed that from 20 to 30 per cent of the heat of the gasoline used as fuel for automobile engines is lost in the form of unburned gases in the exhaust, due to improper carburetor setting.

Other Work of the Bureau

More experimental work on mining explosives with reference to increased safety and efficiency was performed. Plans were initiated for an international conference on the standardization of mine-rescue apparatus. Methods for reducing losses of anthracite in mining operations were studied. Timbering methods for metal mines were investigated. A special study was made of the ventilation of metal mines and of the rock-dust problem in such mines. The bureau called attention to certain methods for the prevention of waste in the slate-quarrying industry. Methods for reducing waste in the mining and preparation of talc were pointed out. In the course of the year the bureau trained 12,525 miners in rescue and first-aid methods, the largest so trained in any fiscal year since the beginning of the training work.

PHOSPHATE INDUSTRY DECLINES IN CANADA.

A report issued by the Imperial Mineral Resources Bureau dealing with production of phosphates in the British Empire contains the statement that, prior to the development of the United States' phosphate deposits, Canada produced important quantities of phosphate rock, and exported considerable amounts to the United Kingdom, but in recent years the importation of cheap phosphate rock from the United States has seriously affected the phosphate mining industry of this country. Although the region extending from the Ottawa River on the south, northwards through the townships of Buckingham, Templeton, Wakefield, Bowman and Hincks, abounds in apatite deposits, the annual output of the Dominion in the past few years has amounted to only a few hundred tons, obtained during mica mining operations in Ottawa county, Quebec. Buckingham township in Quebec is the principal seat of the phosphate industry in Canada, where phosphate rock is manufactured into fertilizers, phosphorous and its compounds, but the raw material used in the process is almost entirely imported from the United States. Whereas, in 1914, there was a total production of phosphates in Quebec and Ontario of 852 long tons, the output dropped to 21 long tons in 1919. Imports from the United States for the year 1914 were 829 long tons, but, in 1919, the figures rose to 1,385.

ARGONAUT GOLD.

A recent report issued by the firm of Geo. Hamilton & Co., who sponsored the Argonaut issue, shows as follows:—During the past year considerable development work has been done, both on the 200 and the new 350 foot levels. Underground workings on the 200 foot level is in excess of 2,000 feet, while several hundred feet of drifting has been done on the lower level. The chief feature of the 350 foot gallery lies in the "Rainville Vein," which up to the present has been opened up for a total length of 250 feet, giving an average value of over $20 per ton. The workings on this level are 5 feet in width, so far, although the vein itself, along which development work is being carried out, is known to be much wider. In no case, in these workings on all levels, have the ends of any veins been reached. Another vein known as No. 354 has been cut for approximately 40 feet and has averaged over $20 per ton.

A summary of the engineers' reports shows that values of the different veins, taken at the surface and at the 85 ft., 200 ft., and 350 ft. level runs from $15 to $28 per ton. The concensus of opinion, based on the engineers' reports is that the property under the control of the Argonaut Gold, Limited, is one containing a very large tonnage of paying mineral and that its value is likely to increase with the deepening of its works, due to the presence of an extensively rich porphry dyke. Timber is now being cut with a view to beginning the construction of a new mill next spring and a standard gauge railway is being built to Argonaut and is expected to be finished by December next.

Northern Ontario Letter

THE SILVER MINES

November Silver Production

Silver production during the month of November from the mines of the Cobalt district reached approximately 900,000 ounces of silver, valued at about $630,000. After adding the premium on United States funds, the mines realized an income of close to $700,000 for the month. No further increase is anticipated until next spring, at which time a number of idle mines will probably be re-opened.

The preparation of preliminary estimates of silver production for the whole of 1921 from this district is under way and may be available for presentation next week to the readers of the Journal. An interesting feature will be that the aggregate silver production from this district since the discovery of silver in Cobalt in 1903 will show not far under $200,000,000.

The Cane Silver Mine

A representative of the Hudson Bay Mines has just completed an examination of the Cane Silver Mines, situated in the township of Cane on the Elk Lake Branch of the T. and N. O. Railway. Officials, acting in their individual capacity, are already involved in the ownership of stock in the Cane Silver Mines, and the present examination is for the purpose of determining whether or not the Hudson Bay Company itself will participate in the venture. There are three shafts on the property, but the greatest importance attaches to vein No. 8, where a shaft was driven to a depth of 42 feet, and from which about $1,200 worth of silver ore was taken. The vein is composed of aplite and is upwards of 12 inches in width. It differs from the aplite veins in the Elk Lake district in that the walls are exceedingly free, while the aplite in the majority of the Elk Lake veins appears to be frozen to the diabase. The representative of the Journal has obtained the opinion of A. G. Burrows, geologist for the Ontario Department of Mines, with respect to the occurrence of diabase in Cane township. Mr. Burrows announces the diabase to be in the form of a sill, and this encourages the belief that silver deposits may be found in commercial quantities. The area differs

from the Cobalt district in that at Cobalt the conglomerate formation with which the diabase came into contact fractured easily, and these fractures gave easy access to the silver-bearing solutions accompanying the diabase intrusion, whereas in Cane township, the diabase sill passes through quartzite formation which shows no evidence of having fractured. This tends to show that the more promising points to explore for silver ore in the Cane area lie in the fractured zones in the diabase itself at points in close proximity to the quartzite.

South Lorrain

Property owners in the South Lorrain district are optimistic with regard to the Mining Corporation of Canada having taken a working option on the Haileybury Frontier property. Silver is showing in encouraging quantities at four different points in the present workings. As work proceeds, it is not unreasonable to expect certain of these shoots to extend beyond their present known limits, with possibilities of leading to additional important silver deposits.

Working Deeper at Violet

Arrangements have been made to continue operations to greater depth on the Violet property of the La Rose Consolidated. Results achieved at the deepest point so far opened up have been exceptionally favorable, and the prospects are believed to be good for opening up additional ore at greater depth.

Nipissing Prospering

The Nipissing enjoyed another prosperous month during November, the official details of which are promised during the second week of December. Recent developments on this mine have comprised the brightest spot during the past year in connection with the silver mining industry of this country. There is considerable speculation as regards the January dividend. In recent years it has been the policy of the Nipissing to disburse a double dividend in January, and stockholders are wondering if the cut to 3 per cent quarterly during 1921, as compared with 5 per cent quarterly in preceding years, will alter the policy of making a double January disbursement.

Silver Prices May Be Affected

Cobalt mine operators are watching the trend of events at the Disarmament Conference, Washington, where the discussion of the financial status of the nations is expected to involve the question of metallic backing behind the paper currency now in circulation. Local operators do not appear to be enthusiastic in regard to the possibility of bi-metallism being actually adopted, but should such occur it would mean a new lease of life for many silver mines, as well as adding in a big way to the value of the present producers. This question is referred to elsewhere in this issue of the Journal.

Crown Reserve

Announcement is made that the Crown Reserve Mining Company contemplates forming a company for the purpose of operating the property recently explored in the Larder Lake district. It is proposed to include the Crown Reserve, Porcupine Crown and Imperial Crown companies in a scheme to provide about $250,000 with which to explore and develop the Larder Lake claims in a comprehensive manner. The group consists of thirteen claims.

Elk Lake and Gowganda Districts

The Alpine Silver Mines is being worked aggressively and is the second largest operation in the Gowganda district. The Miller Lake-O'Brien is the leading operation and constitutes the only steady producer. It is considered probable that a scheme will be arranged whereby the Trethewey may do some financing with a view to re-opening the Castle property and installing a small mill. This property was understood to be developing well prior to curtailment of work, and the suspension of operations came as a disappointment. The indications appear to be that arrangements will be made to get work under way before the new year is far advanced.

Work is being carried on on the Northcliffe property in the Gowganda district, and officials of the company are optimistic in regard to the outlook.

Freight Rate Reduced

The freight rate reduction which went into effect December 1st, and which reduced carrying charges 10 per cent, will tend to lower costs of operation at the mines throughout Northern Ontario. The feeling is that the cut, although small compared with the advances recorded during the past five years, is, nevertheless, a step in the right direction.

THE GOLD MINES

The Porcupine District

Gold mining in the Porcupine district is looming up as a greater industry than even the more optimistic pioneers ever believed possible. Facts now coming to light in the leading mines are so favorable as to show that in the case of the Hollinger Consolidate, McIntyre-Porcupine and Dome Mines there will probably be a steady growth in developed resources for many years to come, and with the necessity of adding in a big way to milling plants.

McIntyre's Outlook

It is believed that there is little question but that the McIntyre will ultimately add the Plenaurium and the Newray to its holdings, and there are mining men who openly express the opinion that the McIntyre may eventually be found among the mines of nearly the size of the adjoining Hollinger. This belief is based in part upon the fact that the mineral deposition on the zone of enrichment has a "rake" toward the east, and in part upon the fact that the ore bodies on the McIntyre are increasing in size, becoming more uniform, and carrying higher values accordingly as greater depth is attained. In fact, at great depth, according to a theory now taking form in the minds of careful observers, is that the area lying beneath the Pearl Lake "depression" may be found to comprise the backbone, so to speak, of this greatest zone of gold enrichment so far found in Canada.

Predicts a Billion from Porcupine

In this issue of the Journal will be found an article which points out the possibility of this area producing around a billion dollars in gold before its final history is written. Admittedly, this is an optimistic view, but is nevertheless based upon concrete achievement to date and is not unreasonable.

Dome Mining Higher Grade Ore

On the Dome Mines, the results obtained during the past year have been only second in importance to that of the Hollinger-McIntyre area. On the Dome, high-grade ore has been found at depth, a feature of which is the marked difference in composition of the ore as found on the Dome when compared with the Hollinger-McIntyre lodes. The Dome deposits at depth are rapidly elevating the mine to a position

where it is no longer a low grade mine of enormous tonnage but is a high grade mine of huge tonnage.

Developing Paymaster Orebody

Another development which promises to attract widespread attention in the Porcupine field is taking place on the Premier Paymaster property, situated in the township of Deloro, at a point about one mile southwest of the Dome Mines. At a depth of 200 feet on the Paymaster, formerly the Standard, a cross-cut was driven across a body of quartz porphyry measuring about 98 feet in width. Fine sulphides are evenly distributed through this body, and the average gold content is declared to be not far under $5 per ton. A drift is now being driven in the centre of this wide body with the object of again cross-cutting at a point about 100 feet from the first cross-cut. It has been learned that Walter Harvey Weed, well-known geologist of New York, will visit the property some time this month. The Paymaster is being worked by A. S. Fuller, of South Porcupine, together with associates of Butte, Montana.

Schumacher Deal Pending

A deal is said to be pending for the control of the Schumacher Gold Mines which may preclude the possibility of the property being taken over by the Hollinger or the McIntyre, as intimated recently in unofficial circles.

To Re-open Ankerite Property

Arrangements are being made to re-open the Ankerite property in the township of Deloro a short way south of the Dome Mines. Clifford Smith, who is identified with the scheme, has left for New York and is hopeful of having operations under way early in the new year.

Porcupine V. N. T.

No new developments have been reported this week with reference to the Porcupine V. N. T., although it is known that certain negotiations are pending which offer promise of comparatively early developments of importance.

Hayden Shaft De-watered

The plant on the Hayden-Porcupine mine, situated in the township of Ogden, south of the town of Timmins, has been overhauled and is now ready for operation. The shaft has been de-watered to the 300-foot level, and lateral operations are to be carried on at the 100-foot, 200-foot and 300-foot levels. A little later on, the shaft will be de-watered to a depth of 375 feet, and will then be continued to deeper levels. Col. Hayden visited the property this week, and in an interview wth the Journal expressed optimism with regard to the prospects. Col. Hayden believes the property is assured of success as a big low grade proposition near surface, with likelihood of the values becoming concentrated in veins at greater depth.

Teck-Hughes Reorganization

The re-organization of the Teck-Hughes has been one of the outstanding features in connection with mining in the Kirkland Lake field. The company will issue new bonds amounting to $600,000, which, together with $35,000 in cash, will be used to pay off the present bonded indebtedness. This amounts to an extension of time on the bonds. At the same time, the capitalization is being increased from $2,500,000, made up of 2,500,000 shares of the par value of $1.00 each, to $4,000,000, made up of 4,000,000 shares of the par value of $1.00 each. The additional shares are to be offered for sale at 15 cents each to the shareholders, and if not taken up will then be offered to the bondholders, who will be permitted to take them up for 15 cents each and be permitted to pay for them in bonds. This may reduce the bonded indebtedness by $267,750, minus $35,000, or $232,750 net, thereby leaving a debt of $367,250.

Ontario-Kirkland Joins Producers

The new 100-ton mill on the Ontario-Kirkland was set in operation during the closing days of November, and this mine is expected to produce from $1,000 to $1,300 daily.

King-Kirkland Re-organization

A by-law was passed by the King-Kirkland, authorizing an increase in capital from $2,500,000 to $5,000,000, par value of $1.00. The reorganization was based upon the purchase of the two adjoining Ferguson claims, for which 400,000 shares are to be paid, 250,000 of which are to be delivered immediately, subject to pool, and the additional 150,000 to be turned over upon payment of a certain amount of cash. This leaves the King-Kirkland with 3,070,000 shares in its treasury plus a fair amount of cash. Announcement has been made that mining machinery has already been placed on order and arrangements are being being made to conduct an aggressive and comprehensive scheme of underground development.

Kirkland Lake

Good ore is reported to have been found at the 900-foot level of the property of the Kirkland Lake Mining Company at a point comparatively close to the boundary of the Elliot-Kirkland. This immediately gave rise to reports of a possibility of the Elliott-Kirkland merging with the Kirkland Lake.

Larder Lake.

The Crown Reserve is considering the question of organizing a separate company for the purpose of exploring and developing property in the Larder Lake district.

Manley-Reilly Property Optional

James Flynn has secured an option on the Manley-Reilly property in the township of Skead and is planning the organization of a stock company to raise finances with which to carry on operations.

B.C. MINING NOTES.

Stewart, B.C.—Describing the Silverado Group of Mineral Claims in his 1920 Report, George Clothier resident Mining Engineer, said that the showings were at an elevation of 3,500 feet, a short distance south of the big glacier across the Bear River from the town of Stewart. He stated further that the vein "which lies very flat, has been traced for 300 to 400 feet on the surface," that "a showing of from 4 to 14 inches of quartz mineralized with grey-copper" had resulted from slight development, and that "a sample assaying 5 per cent. copper gave 360 oz. a ton silver and $10 a ton gold." These particulars give some idea of the property and the work that must be done on it to make it productive by J. J. Conghlan and his Associates, the Vancouver Syndicate that has taken over the claims. The showings since have been much more extensively developed and work has been proceeding during the past two months on a tramway and other outside camp necessities. It has been the endeavor to complete before the season altogether closes the tramway from the lower to the upper camp; the running of a cable across a canyon from the upper camp to the showings, a distance of 800 feet, to be

used in carrying men and supplies across a slide and also to convey the ore from the mouth of the tunnel to the head of the tramway. A considerable shipment of high-grade ore is to be rawhided out over the snow during the winter.

The S. S. Anyox, in her last call at Stewart, picked up 250 tons of concentrates from the Premier Mine consigned to the Tacoma Smelter. A small shipment of high-grade ore from the Fish Creek Mining Co.'s property, Fish Creek, also was received.

Satisfactory reports are received concerning the results of the season's work on the New Alaska, the Vancouver Gp., and the Idaho. Open cutting and stripping done on the Vancouver Gp. is said to have further exposed three showings, one of which is from 100 to 150 feet wide. The ore in this case is low-grade and can be traced for a distance of 600 feet on the surface. The other two showings have not the same vein width, but are reported to be considerably higher grade. On the Idaho, situated on the north fork of the Marmot River, a 100 foot tunnel has been driven opening a shoot of ore eighteen inches in width, samples from which have given returns running over $500 a ton in all values.

Alice Arm, B.C.—The Dolly Varden Mine has been closed, the railway having been washed out at several points and some of the bridges shaken by the floods. With reference to the Esperanza Mine, situated about a mile from Alice Arm, it is stated that several tunnels are being driven and the ore body opened up in a large way, it being the intention to continue work all winter.

Trail, B.C.—Included in the shipments received at the Trail Smelter of the Consolidated Mining and Smelting Co. for the first week, November 8 to 15 were 385 tons of ore from the Slocan District. Among the properties contributing were the Standard and Van Roi, Silverton. From November 15 to 21 the receipts at the smelter totalled 7,449 tons. Of this amount there were 25 tons from the Paradise, Windermere; 54 tons from the Surprise, Republic; 36 from the Sally, Beaverdell; and 49 from the Van Roi, Silverton. The aggregate tonnage received for treatment at the smelter for the year is 364,247 tons.

New Denver, B.C.—Considerable work is being done on the Bosun Mine, New Denver, owned and operated by the Rosebery-Surprise Mining Company. The Bosun is an old mine, as age goes in the Slocan, and its ore is exceptionally high grade. The original vein had a famous stope on the fourth level that showed continuous lead ore from two inches to a foot in width for a distance of 200 feet. The principal source of present production is the ore body beneath this level. This is being opened by means of drift and raises from the fifth level. About a year ago a second vein was discovered about 30 feet within the hanging wall. From this some very fine bunches of ore have been taken but nothing very large or persistent has yet been found. This vein, however, is much stronger and open than the old or footwall vein. One stope opened on it above the fifth level showed a perfect hanging wall with a dip of about sixty degrees and an average width of vein of eight feet. Both the lead ore and the zinc ore are high grade. The silver content runs up to 180 ounces in the former and to 100 ounces in the latter. As the veins are wide and soft it is found that greater efficiency is obtained from handwork than from machines. In this way the ore and waste are broken down in fairly coarse size, enabling the sorting out of most of the waste and the retention of it in the stope as filling. The mineral, with such fine waste as cannot be readily separated, is delivered at the lake bunker for shipment to the Trail Smelter.

Vancouver, B.C.—A verdict of "criminal neglect" has been returned by the Coroner's Jury against the Britannia Mining and Smelting Co. Ltd., because of the loss of thirty-six lives in the flood disaster at Britannia Beach on October 28th last. The finding of the jury in detail follows: "That W. Lonon and others came to their death on October 28th, 1921, at Britannia Beach, B.C. The disaster was caused by what is known as a railway fill or dump giving way, and we, the jury, declare that it was criminal neglect on the part of the Britannia Mining & Smelting Co. Ltd., under the general management of E. J. Donohue and K. B. Browning, general superintendent and mining engineer for the said company, for deliberately allowing the blocking of a natural mountain stream known as the Britannia Creek, causing a menace to persons living at Britannia Beach." More than forty witnesses were examined at the Inquiry including a number of civil engineers who investigated conditions at Britannia. The members of the jury also visited the scene of the catastrophe. The Attorney-General of British Columbia has under consideration what action the Crown should take with respect to the matter in view of the verdict and there is no doubt that there will be a number of claims for damages brought to Court against the Company by those who lost relatives.

It is announced that arrangements have been completed for the construction of a new Mill at Britannia Beach by the Britannia Mining & Smelting Co. Ltd. Houses also are to be erected for the employees on the bench north of Britannia Creek, where there will be no danger of a repetition of the recent disaster. The mill will be of 2,500 ton capacity, capable of treating under favorable conditions nearly 3,000 tons of ore a day and of producing per annum from 24,000,000 lbs. to 25,000,000 lbs of copper. It is not expected that the plant will be ready for operation before 1923.

Victoria, B.C.—It has been announced by the Hon T. D. Pattullo, Minister of Lands, who returned a few weeks ago from England, that definite action towards the establishment of an Iron and Steel Industry in British Columbia may be looked for shortly. In a published statement he said: "There are many people who consider the establishment of an iron and steel industry in this province to be visionary. Nevertheless sane and reliable men are giving it serious consideration. "Certain British interests, he added, were awaiting the arrival of the necessary data before proceeding with the development of the water power of Campbell River. Situated close to tidewater on the east coast of Vancouver Island, within 120 odd miles from the City of Vancouver and slightly more from the city of Victoria, with iron ore deposits of magnitude within a few miles, this has long been considered as a most attractive water power reserve and one that could not be overlooked by capitalists contemplating launching an industry of the kind in the province. Significance attaches to the presence in Victoria, almost coincidental with Mr. Pattullo's statement of Major A. Belton, who represents British capitalists, and who has been waiting on Hon. Wm. Sloan, Minister of Mines, and other members of the Government to obtain information as to what assistance the Government may be prepared to extend any Corporation

The Canadian Miners' Buying Directory.

Acetylene Gas:
Canada Carbide Company, Ltd
Prest-O-Lite Co. of Canada, Ltd.

Acetylene Welding:
The Toronto Iron Works, Ltd.

A.C. Units:
Powley & Townsley, Limited.

Agitators:
The Dorr Co.
Can. Chicago Bridge & Iron Co., Ltd.
Horton Steel Works, Limited.

Air Compressors:
Belliss & Morcom, Ltd.
Laurie & Lamb

Air Hoists:
Canadian Ingersoll-Rand Co., Ltd
Mussens, Limited.

Air Receivers:
The Toronto Iron Works, Ltd.

Alloy and Carbon Tool Steel:
Peacock Brothers Limited.

Alternators:
MacGovern & Co.

Aluminium:
Spielman Agencies, Regd.

Amalgamators:
Northern Canada Supply Co.
Mine and Smelter Supply Co.
Wabi Iron Works.

Antimony:
Canada Metal Co.

Antimonial Lead:
Pennsylvania Smelting Co.

Assayers' and Chemists' Supplies:
Dominion Engineering & Inspection
Lymans, Limited
Mine & Smelter Supply Co.
Pennsylvania Smelting Co.
Stanley, W. F. & Co., Ltd.

Ash Conveyors:
Canadian Link-Belt Company

Ashes Handling Machinery:
Canadian Link-Belt Co., Ltd.

Assayers and Chemists:
Milton L. Hersey Co., Ltd
Campbell & Deyell
Ledoux & Co.
Thos. Heys & Son
C. L Constant Co.

Asbestos:
Everitt & Co.

Balls:
Hull Iron & Steel Foundries, Ltd
Peacock Brothers Limited.
The Wabi Iron Works.
The Hardinge Conical Mill Co.
The William Kennedy & Sons, Ltd.

Ball Mills:
Hardinge Conical Mill Co.
Hull Iron & Steel Foundries, Ltd
The Wabi Iron Works.
The William Kennedy & Sons, Ltd.

Babbit Metals:
Canada Metal Co.
Hoyt Metal Co.

Ball Mill Feeders:
Hardinge Conical Mill Co.
Hull Iron & Steel Foundries, Ltd

Ball Mill Linings:
Hardinge Conical Mill Co.
The William Kennedy & Sons, Ltd.
Peacock Brothers, Limited
Hull Iron & Steel Foundries, Ltd.

Belting—Leather, Rubber and Cotton:
Canadian Link-Belt Co., Ltd.
The Mine & Smelter Supply Co.
Northern Canada Supply Co.
Jones & Glasco.

Belting:
R. T. Gilman & Co
Gutta Percha & Rubber, Ltd.

Belting—Silent Chain:
Canadian Link-Belt Co., Ltd.
Hans Renold of Canada, Limited, Montreal
Jones & Glassco (Regd.)

Belting (Transmission):
Goodyear Tire & Rubber Co

Belting (Elevator):
Goodyear Tire & Rubber Co.

Belting (Conveyor):
Goodyear Tire & Rubber Co.
Gutta Percha & Rubber, Ltd.

Bins and Hoppers:
The Toronto Iron Works, Ltd.
Can. Chicago Bridge & Iron Co., Ltd.
Horton Steel Works, Limited.

Blasting Batteries and Supplies:
Canadian Ingersoll-Rand Co., Ltd
Mussens, Ltd.
Canadian Explosives, Ltd.
Powley & Townsley, Limited.

Bluestone:
The Consolidated Mining & Smelting Co
The Conlagas Reduction Co., Ltd.

Blowers:
Canadian Fairbanks-Morse Co., Ltd
Northern Canada Supply Co.

Boilers:
Canadian Ingersoll-Rand Co., Ltd
Marsh Engineering Works
R. T. Gilman & Co.
The John Inglis Company
Wabi Iron Works.

Blue Vitriol (Conlagas Red):
Canadian Fairbanks-Morse Co., Ltd.

Bortz and Carbons:
Diamond Drill Carbon Co.

Boxes, Cable Junction:
Standard Underground Cable Co. of Canada, Ltd
Northern Electric Co., Ltd.

Brazilian Rough Diamonds:
Diamond Drill Carbon Co

Brazilian Mica:
Diamond Drill Carbon Co

Buggies, Mine Car (Steel)
Hendrick Manufacturing Co

Brazilian Ballas:
Diamond Drill Carbon Co.

Brazilian Rock Crystal:
Diamond Drill Carbon Co.

Brazilian Tourmalines:
Diamond Drill Carbon Co.

Brazilian Aquamarines:
Diamond Drill Carbon Co.

Bridges—Man Trolley and Rope Operated—Material Handling:
Canadian Mead-Morrison Co., Limited

Bronze, Manganese, Perforated and Plain:
Hendrick Manufacturing Co.

Buckets:
Canadian Ingersoll-Rand Co., Ltd.
R. T. Gilman & Co.
Hendrick Manufacturing Co.
Canadian Link-Belt Co., Ltd.
Marsh Engineering Works
Mussens, Ltd.
MacKinnon Steel Co., Ltd
Northern Canada Supply Co.
The Wabi Iron Works

Buckets, Elevator:
Canadian Link-Belt Co., Ltd.
Hendrick Mfg. Co.
Peacock Brothers Limited.

Cable—Aerial and Underground:
Canada Wire & Cable Co.
Northern Canada Supply Co.
Standard Underground Cable Co. of Canada, Ltd
Peacock Brothers, Limited

Cableways:
Canadian Mead-Morrison Co., Limited
Fraser & Chalmers of Canada, Ltd.
Mussens, Ltd.
The Wabi Iron Works
R. T. Gilman & Co.

Cages:
Canadian Ingersoll-Rand Co., Ltd., Montreal
Northern Canada Supply Co.
Fraser & Chalmers of Canada, Ltd
The Electric Steel & Metals Co
The Mine & Smelter Supply Co
Mussens, Ltd.
The Wabi Iron Works

undertaking the production of pig iron in the Province and also to obtain detailed authoritative data concerning the magnetite, hematite, and other necessary resources of British Columbia.

TORONTO MINING QUOTATIONS.

Quotations on Active Stocks on Standard Stock Exchange, Toronto, on 6th December, 1921.

Silver	High	Low	Last
Adanac Silver Mines, Ltd	1⅜	1¼	1¼
Beaver Consolidated	23	20½	23
Crown Reserve	9¼	9¼	9¼
Gifford	½	⅜	½
La Rose	33	31½	32
Mining Corp. of Can.	1.06	1.00	1.00
Nipissing	7.00	7.00	7.00
Ophir	⅜	⅜	⅜
Peterson Lake	5	4¾	5
Temiskaming	25	25	25
Trethewey	10¼	9	10¼
Gold.			
Atlas	14¾	14	14
Dome Extension	71	71	71
Dome Mines	21.25	21.00	21.00
Gold Reef	1⅞	1¾	1¾
Hollinger Cons.	7.81	7.75	7.78
Inspiration	3	3	3
Keora	10	9⅞	10
Kirkland Lake	31	31	31
Lake Shore M. Ltd.	1.22	1.19	1.20
McIntyre	1.97	1.90	1.95
Moneta	8	7¾	7⅞
Porcupine Crown	13½	13¼	13¼
Porcupine V.N.T.	17	15¾	15¾
Preston East Dome	2¾	2¾	2¾
Schumacher	25½	24½	24½
Teck-Hughes	16	15	15½
Thompson Krist	2⅝	2¼	2⅝
West Dome	6	5⅛	5¾
West Tree Mines Ltd	3¾	3¼	3¼
Wasapika Gold M. Ltd	3¾	3½	3¾
Miscellaneous			
Petrol Oil	19½	19½	19½
Rockwood Oil, Gas	⅜	⅜	⅜

METAL QUOTATIONS.

Following are the fair average prices for ingot metals (in less than car-loads):

Toronto	Cents per lb. 6th Dec. (Unchanged since last week).
Copper, Electric	17
Copper, Casting	16¾
Tin	35
Lead	6¾
Zinc	7½
Aluminium	27
Antimony	9

U.S. PRODUCTION OF SOFT COAL.

Production of soft coal in the week ended November 26 dropped to 7,083,000 net tons. The decrease of 1,811,000 below the output of the week preceding was due chiefly to the occurrence of Thanksgiving Day, but also to slackening demand for coal.

EDITORIAL

THE POLITICAL WORLD.

The result of the general election, which was not announced in time to enable us to comment on it editorially last week, has been to render the Liberal party practically independent of any probable combination against it in the new Parliament. The Liberals will not have an absolute majority in the House of Commons. But we can scarcely imagine an issue arising on which fidelity to their respective principles would permit of Conservatives and progressives combining to defeat them.

In one respect, Hon. Mackenzie King, whose accession to the Premiership in a few days' time now is indisputable, is exceptionally fortunate. He has ample material available to form a Government that shall be strong not only in the personalities of those who compose it, but strong, above all, in the confidence of the people of Canada. In particular, he will be fortunate if he is able to enlist the services of Hon. W. S. Fielding, and we trust not only that he will be successful in doing so, but that those services will be utilized in his aforetime office of Minister of Finance. Mr. Fielding's long and loyal service to Canada, his ability and his high sense of public duty have secured for him an almost unique position in the regard of his fellow-countrymen, and almost irrespective of party.

We confess it is with relief that we apprehend from the state of Parliamentary parties that the influence of the Progressive party on tariff legislation will be a far from dominant one. For, on grounds which we indicated at some length, a couple of weeks ago, in our judgment the fiscal proposals of that party, taken in their intirety, were of such a nature as to be likely gravely to impair the fabric of Canadian industry. In the heat of an electoral contest, extreme things are liable to be said, and hopes which, to a large extent, are impossible of realization, are liable to be raised. But, once in office, the Liberal party will represent the whole people of Canada, and will perforce take cognizance of the interests of the whole people. It will be by those interests, and not by any idea of "*Vae Victis!*" that its course will be shaped.

We believe that, in many respects, the tariff needs revision. But we believe, further, that the task of framing an adequate and equitable tariff — one which will have regard to the interests of producer, manufacturer and consumer alike — will prove to be well within the competence of the statesmanship of that party on which the responsibility for the government of the country must now devolve.

WILL INVESTIGATE POWER RESOURCES.

The Commissioners of the Ontario Government Railway have authorized Mr. S. B. Clement and Mr. J. G. Kerry to make a complete report on power possibilities and power required for electrification of the Temiskaming & Northern Ontario Railway. It is announced that the report is to be presented in three months time.

The electrification of this railway has been seriously discussed for several years. The former Commissioners gave the matter much attention and it has long been felt that electrification of the road is sure to be accomplished some time. The investigation now authorized will very likely result in the obtaining of information which will prove the project to be a feasible one.

Our special interest in this matter, aside from a desire to see our natural power resources utilized, is in the impetus to development of the mining industry that may be expected to follow development of the available water powers. Investigation for the purposes of the Ontario Government Railway should result in the obtaining of information which will help the Government to deal with the applications for water power rights in a reasonable length of time.

We have been asking for an investigation of water power resources for the benefit of the mining industry. The Railway Commissioners have been desirous of getting ahead with their electrification plans. Pulp and paper industries have also been interested in the water

power resources. The decision to proceed with the investigation at once should therefore be welcomed by all parties.

The investigation of the power resources is to be accompanied by an investigation on power required for electrification of the railway. It is reasonable to expect that the Ontario Government should at the same time make investigation of the needs of the mining and other industries that are making possible the development of the area served by the railway. We are pleased that something is being done that will be of assistance to both the railway and the industries and that the Government has approved of the Commission's proposals. We hope that we will soon be able to record that the power needs of the industries as well as the power needs of the railway are receiving attention. The checking of production by delays in obtaining more power is a matter of serious concern to the mining industry and should be of some concern to the Government.

"BLUE SKY" LEGISLATION.

The Ontario Government is evidently contemplating enacting what is known as "blue sky" legislation for that Province. And it is certainly taking a wise course in collecting a mass of opinion, with a view, no doubt, to the sifting and examining of the same before it puts the conclusions at which it arrives in definite legislative shape. This idea of looking before it leaps is to be very heartily commended. The statute books of the Dominion and the various Provinces alike would not contain as much crude, if well-intentioned, legislation as they do had all our legislative bodies always been imbued with the same laudable desire to inform themselves thoroughly on all the matters as to which they aspire to legislate.

Mr. A. H. O'Brien, the Ontario Government's investigator, recognizing that mining stocks and mining companies are the stocks and the companies with which "blue sky" enactments, as a rule, most intimately concern themselves, has naturally turned, in his desire to collect informed and authoritative opinion, to the officers of the Standard Stock and Mining Exchange, of Toronto, among other sources of information. He has addressed a series of questions to Mr. P. J. Cannon, the president of the Exchange, which, together with Mr. Cannon's replies thereto, we reproduce elsewhere in this issue.

The first question put by the investigator is as to the advisability or otherwise of licensing dealers or agents who sell securities. The Exchange is in favor of the licensing of both, and takes the view that a dealer should be a member of some organized stock exchange operating under a Canadian charter, and that agents should be responsible parties working for such a dealer. The president of the Mining Exchange evidently considers that no small part of the victimization that has been possible, in connection with the sale of securities, has arisen from the irresponsibility of dealers or agents, or both.

As to the amount of percentage that should be paid in the way of commissions to salesman, promoter and prospector and for advertising, the Exchange gives the opinion, based on information obtained from specialists, that a minimum of twenty-five per cent. of the money raised would be required for floating natural resources companies, this twenty-five per cent. to cover remuneration to sub-agents, advertising expenses and promoter's profit. On the whole, we are of opinion that, in the case of mining propositions, the twenty-five per cent. of the money raised, which it is suggested should be the maximum for the purposes named, is reasonable and usual.

Asked as to whether one commissioner would be sufficient to administer a "blue sky" law, in connection with stocks for industrials, mining companies, etc., the Exchange replies that there should be three commissioners to deal with natural resource companies—one to possess the requisite business and financial qualifications, another to be a man "who knows the mining business from the top to the bottom, and the third to be one capable of interpreting the legal respects of the Act. In this view, also, we are inclined to concur. At any rate, we regard it as essential that a man versed in the operations of mining companies, and in complete sympathy with the development of Northern Ontario, should be one of the commissioners for the administration of a "blue sky" law in connection with mining companies. But as such a law would presumably deal with industrial and other companies as well, it may be that a commissioner well versed in the concerns of such companies might also be a necessity in their cases.

There must be a great variety of opinion as to the best way of regulating the sale of shares and the "blue sky" discussion will doubtless bring forward many views. The brokers have responded quickly to the invitation to express their views. It is to be hoped that others interested will contribute to the discussion before any new legislation is enacted.

WILL WAGES COME DOWN?

When the cost of living was at dizzy heights, mining companies found it necessary to pay very high wages. The downward march of living costs and the difficulty of marketing many mine products has necessarily resulted in lower scales of wages at most mines. It is being freely predicted that there will soon be further reductions in wages to a level commensurate with the changed conditions. There has, however, been no reduction made at most of the Ontario gold mines, and no announcement has yet been made of coming reductions at the big mines.

One company, operating at Kirkland Lake, reduced its wages, but there has been no common action by the operators towards reduction. At Cobalt, wages have been lowered during the year and it does not seem unlikely that this will, sooner or later, affect wages at Porcupine. In looking forward to the coming year one

feels inclined to predict lower labor costs; but there is as yet little evidence of reduction at the gold mines. The depression in the American metal mining industry has made necessary many reductions in wages, and has, in many cases, made operation impossible at even the reduced wages which were paid for some months. It is beyond question that the cost of living is decreasing and that we are not likely to experience again, for some time, such high labor costs as obtained in 1920.

AN OPTIMISTIC VIEW.

The gold mines of the Porcupine district are doing very well and promise to produce large quantities of ore for some years. The success of the foremost producers is, however, leading to some very extravagant predictions as to the future. The assumptions made are far from ones that any gold miner would like to be responsible for. Views as to the future are, however, always of some interest and we reproduce below a rosy view from "Saturday Night." It is interesting as an example of the result of too much extra polation. Saturday Night's writer says under the caption "Bullion In Gold."

When the final chapter in the history of the Porcupine gold area is written and when the final analyses of the Hollinger Consolidated and the McIntyre-Porcupine are made, it is not improbable that an aggregate production of a billion dollars in gold will be shown. To arrive at this opinion, it is necessary to assume a great deal and to therefore write contrary to the wish of the operators of these mines. Nevertheless, some of the factors upon which the view is based are these:

From an area lying within 800 feet of surface, the Hollinger Consolidated has produced over 40 million dollars and has ore amounting to another 40 million dollars in sight. In addition to this are a large number of orebodies which have not yet been touched, and which may finally produce another 40 million from that area between the 800-ft. level and surface. This means that the prospects are that the Hollinger will yield about 120 million dollars from that zone lying between surface and the 800-ft. level, or, in other words will produce approximately 15 million for each 100 feet in depth.

Keeping these facts in mind, and taking into account that the management is considering sinking a shaft to a depth of 6,000 feet, it at once becomes possible to estimate an output of 900 million dollars from this property "assuming" the extent and richness of the orebodies continue as heretofore.

On the McIntyre-Porcupine, the number of orebodies are less than on the Hollinger, but the present indications appear to be that in that area lying below the 1,000-ft. level, the mine may reasonably produce 5 million dollars for each 100 feet in depth. Should such a condition prevail over the 5000 feet lying between the 1000-ft. level and a depth of 6000 feet, this section of the mine would yield 250 million dollars.

In addition to these two mines, there are other adjoining properties which may also figure in a big way in future production. These include the Porcupine V. N. T. on which an excellent vein system occurs and on which some very rich ore has been proven at depths down to 600 feet, the Schumacher on which ore has been opened up to the depth of 700 feet and upon which the chances of getting big ore bodies at great depth are good; the Plenaurum and the Newbray lying to the east of the McIntyre, and the Rochester lying to the north-west of the Hollinger, and the Northerown mines to the south.

This summary deals alone with that part of the Porcupine district known as the Hollinger-McIntyre section, and does not include that other important area known as the Dome section where many millions in gold ore is already in sight.

As for the basis of "assuming" a continuation of values to great depth, there is the fact that on the Hollinger and the Porcupine Crown Mines diamond drill holes have been driven a depth of 2000 feet and with no evidence of change in the geologieal structure. This has been further proven by actual underground operations on the McIntyre to a depth of 1,875 feet where lateral operations are now under way in cutting a station. The manager of the McIntyre, R. J. Ennis, is authority for the statement that the geological condition prevailing at that depth is exceedingly reassuring and has expressed the belief that mining will be carried to great depth, and that the life of mines will be long.

Present production is at an aggregate rate of between 17 and 18 million dollars annually. To produce a total of one billion dollars would require an output of 20 million dollars a year spread over a period of 50 years. It is already evident that production will easily attain a rate of 20 million annually, and the question left to decide is the number of years during which such a record may be maintained.

Therefore, there does indeed appear to be good possibilities of the Porcupine area producing a billion dollars in gold. Moreover, this area comprises but a small part of a vast territory throughout which there is likelihood of many new mines being developed.

T. & N. O. RAILWAY TENDERS

Chairman George Lee and members of his Timiskaming & Northern Ontario Railway Commission were closeted with members of the Ontario Provincial Cabinet during last week, preparing the plan of contract for the T. & N. O. 70-mile extension northward out of Cochrane. Tenders are to be called for, returnable January 9, for a completed railway line.

By the end of 1922, according to Chairman Lee, it is the expectation that 40 miles of the 70-mile extension will be completed, and the whole extension completed by December 31, 1923. The first stretch of work will probably be that from Cochrane to the Abitibi, where there is some bridge work to be undertaken as soon as the line reaches the point. The railway is estimated to cost $3,000,000.

Chairman Lee discussed most enthusiastically the prospects of the country to be opened up by the extension. "The extension," he said, "will open up the finest stretch of agricultural county in Northern Ontario it will open up the biggest gypsum beds in the world; give transportation facilities to the great prospective fishing industry of James Bay and Hudson Bay; serve 3,000 miles of coast line, and open up a power development proposition at Tin Can portage as big as Niagara itself."

Contrary to general belief, said Mr. Lee, James Bay is navigable during eight months of the year. Whitefish and sea trout are its principal yields.

Hollinger Nearing 1,000,000 Tons

What Hollinger 1921 Operations Look Like and What Is Expected in 1922.

By ALEXANDER GRAY

To the end of July, reckoning by the milling log, Hollinger Consolidated Gold Mines had crushed about 480,000 tons for a gross income of $5,126,050.65. It does not require higher mathematics to demonstrate that the total income per ton milled was $10.60, which, of course, includes the premium upon the company's gold.

Since then daily crushings have been increased—not so much in August, September and the early part of October. With the completion of secondary crushing arrangements in the latter days of October the stamp duty was brought to the peak; so calculations are being made that Hollinger Mines will be enabled to report a second tonnage milled. The figures will be so near to the million mark, either way, as to invite a forecast. The management may fall short of its objective, or it may go over the top. Undoubtedly more than a million tons would have been put through, were it not for the shortage of power in the earlier months of the year.

What will be the gross value of the tonnage treated can only be surmised, for the chances are General Manager Brigham reduced his grade when his mill began to hit the high spots—which is the sounder practice. Taking it that a million tons, or thereabouts, will be the Hollinger return, and that the grade will be about $8.75, simple arithmetic makes the grand total gold content extracted from the mines $8,750,000. From that must be deducted the metallurgical loss, which would make the value of the gold recovered around $8,400,000. Adding to this the premium upon the gold, it is confidently surmised the gross income should not be less than $9,500,000, if it does not go beyond that. Possibly Mr. Brigham will attain to his cherished ambition and mill the million tons and more—and few know what will be the average grade for the year.

In any event, should the ore reserves be fairly well retained, despite power shortage, and the profits are what they are understood to be—more particularly because of the gold premium—mining capitalists and scientists—perhaps a stray banker—will bestow a tribute upon this Canadian source of yellow metal. When the power failure occurred, coal as a heroic remedy was costly. Otherwise the record tonnage milled automatically would have reduced working costs. The evidence of this is understood to be obtainable in the results of recent four-weekly periods, when a profit of about $500,000 is alleged to have been earned, all of which sustains the impression that Hollinger will make more records in 1922.

Sooner or later Hollinger will take the lead among gold mines—but not without ample power and extensions to the plant. The limit has been reached in the matter of cyanide tanks—and more will be provided. Rolls and ball mills are to supplement the stamps. Eventually the stamps may be altogether discarded and a daily milling average of 6,000 tons maintained. In reality Hollinger capacity in the future will be measured by power, since labor is plentiful and the ore bodies continue to be more than the conservative management cares to emphasize until all the factors essential at surface are forthcoming. At the moment, the milling record is held by the New Modderfontein, at the Witwatersrand: 1,038,000 tons in the year ended June 30 last. That company made a total net profit of £1,720,202 and its operations as set forth by Sir Evelyn Wallers were:

Working Revenue	£2,969,198	54/10
Working Expenses	1,270,146	23/5
Working Profit	£1,699,052	31/5

Included in the revenue item is £751,427, received as premium upon the gold recovered. It was a handsome honorarium of 14 shillings and 5 pence over and above the mint value of what gold would have brought without the premium. Otherwise the grade of ore milled was only slightly higher than that of the Hollinger in 1920. Automatically the per ton profit was enhanced to a much greater extent than the Hollinger realized. The Rand mine premium was 44.2 per cent. That of the Hollinger may have been about a quarter of this. Which leaves it to the relative grades of ore to prove priority. Conceding the New Modderfontein recovery was approximately $10 per ton, it is doubtful whether that of the Hollinger during 1921 has been permitted to go above $9. In all probability the Hollinger grade averaged around $8.75, as already pointed out, consequently the aggregate comparative result is dependent upon the total tonnage milled.

Whatever Hollinger grand totals for this year will be, they cannot be attributed to boosting the grade. For the reason explained—the use of coal when the hydro-electric failed to meet requirements—Hollinger costs were increased. All of which does not alter the fact that Canada at Porcupine has the nearly greatest gold mine and it should head the world's outputting sheet in 1922, though New Modderfontein has ore reserves of 8,884,600 tons of the average value of 8.4 dwts. During its fiscal year New Modderfontein developed 1,234,100 tons of the value of 10.5 dwts. As against this the Hollinger reserves of 4,087,083 tons a year ago were valued at $10.20 per ton. New Modderfontein has a shade the better of it in value and over double the fixed quantities.

Had the Hollinger grade and premium as disclosed for the months ended with July been continued throughout the year, the story of 1921 as a whole would be more altitudinous. A million tons or thereabouts that would represent say $10.00 in gross income per ton would be a possibility. There the analogy will have to end for the time being, because New Modderfontein had almost 9,000,000 tons in reserve last June, had paid £7,433,750 in dividends, whereas Hollinger may have preserved its 4,087,000 tons, after distributing $16,556,000—which is 551 per cent. on the original capital of the Hollinger company—besides which there is over $6,000,000, it is understood, in cash, bullion and other liquid assets. At any rate, shareholders in the Porcupine company are amply covered by ore reserves, the further potential value of the areas, a strong treasury, being the profitable fruits of ten years of production, as follows:

Years	Gross Income	Profits	Dividends
1912	$ 924,571.44	$ *621,801,69	$ 270,000
1913	2,493,971.76	1,503,822.87	1,170,000
1914	2,764,130.64	1,611,058.55	1,170,000
1915	4,285,786.18	2,477,044.42	1,720,000
1916	5,285,862.11	**2,856,409.07	3,126,000
1917	4,271,260.10	1,820,414.93	738,000
1918	5,908,327.87	2,588,563.01	1,230,000
1919	7,063,099.21	3,840,482.11	1,720,000
1920	7,162,611.13	3,292,341.59	2,214,000
1921	9,500,000.00	***5,000,000.00	3,198,000
Totals.	$49,659,620.44	$25,611,938.24	$16,556,000

*Includes premiums upon shares sold.

**Includes premium upon shares sold.

***Necessarily all 1921 figures are estimated excepting dividends.

Manifestly Hollinger Consolidated caught up with its capitalization. No longer is it a stern chase. The mining position leaves no heartburnings, in which respect the Dome and McIntyre companies are sustaining themselves satisfactorily. Deeper development at the Dome and McIntyre is favorably impressive. Hollinger is endowed with so many ore bodies, it will be some years before the area between the 550 and 1,250 foot levels is fully determined, even though power and milling facilities are supplied. How much ore there is in the upper levels after taking out over $50,000,000 gross, cannot be estimated. A great deal of territory is unexplored. Recurring hindrances throughout ten years have handicapped the management, but they have not detracted from the merits of mines which began their crushing career with ore reserves estimated at about 500,000 tons valued at $11,000,000, yielded all that is recorded in the foregoing tables, from upper levels as yet removed from exhaustion—which have workings representing a league a year for every crushing year. In the ten years about 4,900,000 tons have been milled, each ton has represented better than $10 in gross income, practically $5 in profit, and has netted to shareholders $3.37 in dividends per ton, all of which attests that the upper workings—with their further millions in reserve—without risk of overestimation, played a conspicuous part for a decade. Many eminent engineers owe apologies to the section above the 450-foot level—from which the bulk of production has come. One such engineer—an actuarial scientist at that—in 1914 sent this to the writer, which will bear publication in the light of what has transpired:

Value of Hollinger Shares as Estimated in 1914

P. A. Robbins' estimate of ore actually developed January 1st, 1914, gives a share value of $12.90. The assured chances of finding more ore will considerably enhance this value. Mr. Robbins' estimate of tonnage and grade above the 550-foot level, as in Annual Report for 1913, was:

Tonnage 1,321,100
Grade $13.25
Extraction (96 per cent.) $13.25
Working costs $4, depreciation 75c. Total $4.75
Working profit, per ton, say $8.00
In 1914:—
Tonnage milled 203,000
Working Profit $1,624,000
In 1915 and thereafter:
Tonnage milled 365,000
Life from January, 1915 ..... 3 years
Annual Distributable Profit $2,920,000
Present value (factors 4 per cent. and 7 per cent. 3 years, $.390349—$12.46) .. $7,480,000

To this must be added approximately $1.50 for the cash reserve and 75 cents in dividends still to be paid in 1914, making the present value $14.76 per share.

On assumption that same quality of ore will be found down to 675-foot level as in levels above, this would add one more year life to that of estimate: (Factor .305490). Present value $9,558,300, say $16, or adding cash reserve and remainder of this year's dividend ($1.50 and 75 cents), making a total of $18.25 per share.

On assumption that $10-ore will be mined in same quantity down to 1,400 feet as found above 550-foot level, and that reduction plant will be doubled by end of 1915:—

Ore above 550-foot level January 1st, 1914, 1,321,000 tons at $13.25
Ore between 550 feet and 1,400 feet, 2,380,000 tons at 10.00

Total above 1400-ft. level 3,701,000 tons at. $11.16

Of this, 203,000 tons milled in 1914; 365,000 tons to be milled in 1915—leaving 3,133,077 tons remaining January 1st, 1916.

This gives a life of 4½ years at 700,000 tons per annum:

Grade $11.16
Extraction ..... 96 per cent.
Recovery $10.71
Total working costs, per ton $4.50
Distributable profit, per ton $6.21

Assuming dividends are continued in 1914 and 1915 at same rate (39 per cent.) and surplus applied to increasing plant, development, etc., in preparation for increased tonnage in 1915, we have:—

Dividends, 1914-1915 ..... $2,340,000
(Or $1.95 per share per annum.)
Surplus available $1,686,000

Through the remaining 4½ years' life will yield annual profits of $4,347,000. Present worth, January 1st, 1916, $15,521,700.

Discounting this 16 months gives the value at September 1st, 1914, as $14,189,900, or $23.65 per share.

Add to this 18 dividends payable between September 1st, 1914, and January 1st, 1916, or $2.70 per share, or allowing for discount, say $2.50 per share, and we get the present value per share, $26.15.

Summary:—

	Value per share
On ore developed Jan. 1, 1914	$12.00
On ore above 550-ft. level Jan. 1, 1914 ..	14.76
On ore above 675-ft. level	16.00
On ore above 1400-ft level	26.15

None of these take any account of ore in other veins than those at present being developed, beyond 60,000 tons at Jan. 1st, 1914 (12 veins).

At that time the Hollinger merger had not been effected. The author of the analysis quoted is one of that "hard boiled" species whose business it is to make money in mining for their principals. He took the Hollinger alone as he saw it without comprehending the structural features. My cryptic reply to his valuation was that "good is as good as it tastes." Hollinger development was only starting—the milling programme was not even formulated. A year later the Acme properties, as well as those of the Millerton, were consolidated. Then War intervened, de-

spite which the combined areas have "leaped from crag to crag," as it were, until the management is prepared to exclaim "Excelsior" in 1922. Notwithstanding the "hard-boiled" prognosis, two years after it had been registered the late General Manager of the Hollinger, in urging the amalgamation of the three groups of claims, put the tonnage developed underground, indicated by diamond drill and by surface outcrops, at 1,846,000 tons, valued at $17,824,800. Applying the same rule to the Acme, a tonnage of 1,876,360 tons was conceded to it, the gross value being $16,850,180. Whatever of hypothesis entered into those estimates, the deeper levels of the mines are largely undeveloped, and while 3,849,000 tons since then have been extracted from both mines—little having come from the Millerton, so far as is known—the combined ore reserves are greater than they were at the time of the merger.

Before other milling records can be made, however, it is to be reiterated that the company must have ample power undisturbed by seasonal setbacks, additional tankage facilities, and more mills other than the present stamp battery. The objective of the management is a daily crushing of about 6,000 tons—and then shareholders will have quicker action on their money. To accomplish that the Government and business interests will have to co-operate if the $15,000,000 or $17,000,000 production possible is to be put in circulation.

HAILEYBURY-FRONTIER PROPERTY.

Last week, says a despatch from Cobalt to the Toronto Mail and Empire, another Cobalt company launched into an outside enterprise, when Mining Corporation of Canada commenced work at the Haileybury-Frontier property in South Lorrain under a working option. The terms of this option cannot be learned: Mining officials state they are not prepared to give any details for a few days, and Mr. Horace Strong, who heads the syndicate that has been working the Frontier property for some time, cannot be reached.

The Frontier Mine has been developed at the 150 and 300 foot levels. At the 150-foot level 90 feet of ore has been opened up, which can be classed as high-grade milling rock, with some high grade. At the 300-foot level, where work is now progressing, over 100 feet of ore has been developed, running in grade similar to that on the upper level. On the whole it is an extremely promising proposition. Considerable mill rock has been opened up, and if development continues as successfully the mill property should very quickly be in shape for a mill.

SMUGGLING GOLD FROM GERMANY.

Messrs. Samuel Montagu and Co., of London (Eng.), write as follows under date of the 17th ult:—Reuter reported from Copenhagen, under date of November 10th last, an occurrence, which can be described as the work of a super-smuggler, in the following words: "According to a telegram from Aabenraa (Slesvig), Customs offices at Harreslev, on the Dano-German frontier near Flensburg, were to-day inspecting a locomotive constructed in Germany for a Danish firm, to be delivered on November 8th, when they found in it gold ingots to the value of 24,000,000 gold marks (£1,200,000), the intention evidently being to smuggle the gold out of Germany. The Customs officers confiscated the ingots."

HAROLD B. FISK.

New Manager of the Walsh Plate Works, Drummondville, Que.

HAROLD B. FISK who was recently appointed Manager of the Walsh Plate & Structural Works, Limited, at Drummondville, Que., was born in England, 1885. He was educated at the Bishops Stortford Grammar School, the Kings College, London. After serving as a pupil with Baily Grundy & Barrett, a firm of mechanical and electrical engineers, at Cambridge, England, he came to Canada in 1907, entering the service of the Shawinigan Water & Power Company as Operator in the Montreal Terminal Station, being shortly transferred to the head office of the Company, in Montreal,

Mr. Fisk also saw service with the British Canadian Power Company, at Cobalt (now the Northern Ontario Power Company Ltd.), being first assistant to the General Superintendent and afterwards Superintendent of the Metatchouan River Power Development. Also with the Toronto Power Company, at London, Ont.; the Kaministiquia Power Company at Fort William, Ont.; and from 1916 to his present appointment with the Southern Canada Power Company, as Superintendent of the Drummondville Division.

Mr. Fisk was admitted a Member of the American Institute of Electrical Engineers, August 1919.

Northern Ontario's Gold and Silver Mines During 1921

By J. A. McRAE.

The Gold Mines.

During the calendar year 1921, according to preliminary estimates prepared early in December, and based on achievements up until that time, the gold mines of Porcupine and Kirkland, situated in Northern Ontario, produced approximately 677,866 ounces of gold, valued at about $14,011,504.

This production compares with a grand total of 564,312 ounces during 1920, valued at $11,665,797, and which was the previous high record gold output in Ontario. In comparing these figures it should be noted that the increase of $2,345,707 in gold production took place almost entirely during the last half of 1921, and thereby tends to show that an output of close to $17,000,000 may be produced during the new year soon to begin.

The most noteworthy development of the year in the gold mining industry of Ontario has been the sustained good results at the great depth in the Porcupine district. The McIntyre-Porcupine is now operating at a depth of 1,875 feet, while the Hollinger is considering the question of extremely deep developments, and has mentioned the possibility of a new central shaft to be driven to 4,000 feet, and possibly 6,000 feet.

Developments in the Kirkland Lake district have also been extensive and generally favorable. Two new producers, namely, the Wright-Hargreaves and the Ontario Kirkland were brought in. A feature of the year's progress was at the Wright-Hargreaves, where the construction of a 175-ton mill was completed early in May, and which enabled the company to declare a dividend of 5 per cent. payable January 1st.

Three mines in the Porcupine district produced bullion to the extent of over $12,000,000, these being the Hollinger Consolidated, McIntyre-Porcupine and Dome Mines. Great as is the record, it was substantially restricted owing to a shortage of hydro-electric power during the first four months of the year.

Five mines in the Kirkland Lake field produced gold, these being the Lake Shore, Wright-Hargreaves, Teck-Hughes, Kirkland Lake and Ontario-Kirkland, the total production for the year being well over $1,500,000.

The Outlook.

As regards the outlook for the coming year, the McIntyre-Porcupine is assured of an increase of 50 per cent. in its milling capacity, while the Hollinger plans a further increase of about 50 per cent. just as soon as the necessary hydro-electric power may be assured. The Dome also plans a substantial increase, while such mines as the Porcupine V.N.T., Porcupine Crown and Schumacher may reasonably be re-opened and resume production. It is also probable that the Tough-Oakes mine at Kirkland Lake will be in condition to warrant re-opening the mill, and thereby adding another substantial producer to the list.

The Dividend Record.

During 1921 three gold mining companies paid dividends amounting to $4,269,809, the order of their importance being Hollinger Consolidated, McIntyre-Porcupine, Dome and Lake Shore.

Following is a summary of the dividend record of the gold mines of Northern Ontario, it being noted that the Wright-Hargreaves is not included, for the reason that its initial disbursement of $125,000 will not be paid until the opening day of the new year:—

Company	Dividends to to end of 1920	Dividends During 1921	Total Dividends to date
Hollinger Con.	$13,360,000	$3,126,000	$16,486,000
McIntyre-Porcupine	2,002,155	546,042	2,548,198
Dome Mines	1,919,416	477,677	2,397,083
Lake Shore	280,000	120,000	400,000
Tough-Oakes	398,625	———	398,625
Rea Consolidated	12,000	———	12,000

The discovery of gold was made in Porcupine in 1909, and not long after that date the discovery of gold was made at Kirkland Lake. The rise of these two fields has been rapid, the following summary of production since 1910 showing the manner in which the Province of Ontario has risen to prominence as a producer of gold:—

Ontario's Gold Output.

Year	Fine Ounces Gold	Value
1910	3,089	$ 63,849
1911	2,062	42,625
1912	86,523	1,788,596
1913	219,801	4,543,690
1914	268,264	5,545,509
1915	406,577	8,404,693
1916	497,836	10,339,259
1917	420,894	8,698,881
1918	411,976	8,516,299
1919	505,739	10,454,553
1920	564,312	11,665,797
1921 (est.)	677,866	14,011,504
Totals	4,074,939	$74,075,504

VIPOND—NORTH THOMPSON

At a directors' meeting of Vipond-North Thompson held in Toronto, it was unanimously agreed to accept the cash offer received for the remaining block of stock in the company's treasury, thus assuring a continuance of underground development at this mine as quickly as possible. However, it is not likely that actual dewatering operations of the mine will be started before the end of March or the beginning of April, as the officials of the Northern Ontario Power Company find themselves unable to supply the necessary power for mine development work before this time.

Ratification of this deal by shareholders being necessary before such can be actually closed, it has been decided to call a special meeting on Wednesday, December 28. Notices of such will be mailed to shareholders within the next few days.

ONTARIO'S GOLD OUTPUT

The outstanding feature of the Ontario Department of Mines' returns for the nine months ending September 30, 1921, is the growing importance of Ontario's gold mining industry. "Provided the output for the last quarter equals that of the third quarter," says the report, "Ontario's gold production for 1921 will be approximately $13,870,000, and, with the premium added, $15,200,000." Not only does Ontario lead the Canadian Provinces in gold output, but it is quite probable states the report that this year Ontario will have a production exceeding that of California.

Metalliferous Production in Ontario

Returns received by the Ontario Department of Mines from the metalliferous mines, smelters and refining works of the Province for the nine months ending Sept. 30th, 1921, are tabulated below, and for purposes of comparison the quantities and values are given for the corresponding period in 1920. Tons throughout are short of 2000 lbs.

ONTARIO'S METALLIFEROUS PRODUCTION, FIRST NINE MONTHS—1921.

Product.		Quantity 1920	Quantity 1921	Value $. 1920	Value $. 1921
Gold	Ounces	424,297	474,956	8,735,768	9,818,073
Silver	"	7,831,143	6,586,910	8,435,088	4,382,520
Platinum metals	"	214	915	13,917	41,060
Nickel (metallic)	lbs.	7,060,078	4,521,407	2,440,303	1,542,607
Nickel oxide	"	4,886,712	975,310	1,146,768	197,812
Other nickel compounds	"	159,725	169,885	15,362	15,936
Nickel in matte exported*	tons.	17,446	2,908	8,723,000	1,454,000
Cobalt (metallic)	lbs.	159,151	30,564	373,168	91,786
Cobalt oxide	"	509,043	162,364	1,015,696	330,914
Other Cobalt compounds	"	1,717	— —	1,629	— —
Cobalt-Nickel oxides and residues	"	— —	366,581	— —	116,948
Lead, pig	"	1,290,726	2,539,551	117,122	134,871
Copper sulphate	"	98,918	99,553	4,946	5,973
Copper (metallic)	"	4,853,495	2,926,407	795,423	330,084
Copper in matte exported*	tons.	9,497	2,886	2,659,160	451,760
Iron Ore **	"	5,468	22	47,120	99
Iron, pig ***	"	49,422	82,318	1,395,948	2,079,729
Total				35,920,418	20,994,172

General Remarks.

The outstanding feature in connection with Ontario's metalliferous production is the growing importance of her gold mining industry. Provided the output for the last quarter of the year equals that of the third quarter, Ontario's gold production for the full year 1921 will be approximately $13,870,000 and with the premium added, $15,200,000. Fortunately the success or failure of Ontario's gold industry does not depend on the exchange premium. Not only does Ontario lead the Canadian provinces in gold output but it is quite probable that this year the Province will have a production exceeding that of California, which provides about 25 per cent. of the entire gold output of the United States.

Conditions in the iron and steel industry are showing improvement, an indirect result being that absorption of the surplus nickel supplies will be expedited. Unfortunately the nickel-copper smelters and refineries of the International Nickel Company of Canada and the British America Nickel Corporation have been forced to suspend operations completely, the Mond Company alone carrying on at a reduced rate at the present time. Details regarding the principal metals are given under the several headings.

Gold.

Ontario's gold production for the period under review exceeded the 1920 figures by over one million dollars, despite the handicap of hydro-electric power shortage during the first quarter of 1921, when the output was $656,514 less than in 1920. Using the production figures for the third quarter of 1921 as a basis we find that the present production from Ontario gold mines is at the rate of $16,300,000 per annum without the exchange premium or about $17,650,000 including the premium.

Ore milled at the Hollinger mine is now averaging between 3,800 and 3,900 tons daily. The McIntyre is proceeding with the erection of a new 250-ton unit, bringing their total milling capacity up to 800 tons daily.

The Wright-Hargreaves started its mill in May. It will be noted in the table hereunder that the output from this mine for the 9 months was the largest of the producers at Kirkland Lake. An initial dividend of 5 per cent. has been declared, payable on Jan. 1st, 1922. The Ontario-Kirkland 100-ton mill is being started early this month (December).

Details of production are given hereunder:

Silver.

For foreign silver the average New York price for the period was 60.8 cents as compared with $1.09 in 1920. Production shows a decline owing to several properties closing down during the winter of 1920-21 on account of power shortage and the slump in price. A recent find at the Keeley mine has revived interest in South Lorrain. In addition to the shipments of 6,498,019 ounces, worth $4,328,899, from the silver mines, nickel-copper refineries recovered 8818 ounces and gold mines 80,073 ounces.

Refineries—During the period 1685 tons of ore and concentrates and 2597 tons of residues were treated

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* Copper in matte was valued at 14 cents per pound in 1920, 8 cents in 1921, and nickel in matte at 25 cents per pound in both years. Total matte produced was 17,013 tons, of which 7,011 tons were exported.

** Shipments of iron ore totalled 27,775 short tons valued at $119,262. The figures in the table cover shipments to points other than Ontario blast furnaces.

*** Total output of pig iron from both domestic and imported ore was 393,303 tons worth $9,936,597. Figures in the table represent proportional product from Ontario ore.

Source	Daily Milling Capacity tons	Ore Milled tons	Gold Recovery Ounces	Gold Recovery Value $	Silver Recovery Ounces	Silver Recovery Value $
PORCUPINE						
Dome	887	243,280	76,462.5	1,580,619	10,509	6,363
Hollinger	3,500	719,007	290,946.7	6,014,402	54,115	32,623
McIntyre	550	124,174	59,893.3	1,238,105	11,118	6,674
Total	4,937	1,086,461	427,302.5	8,833,126	75,742	45,660
KIRKLAND LAKE						
Kirkland Lake	150	33,871	8,676.1	179,552	1,283	762
Lake Shore	60	15,991	13,462.6	278,383	879	527
Teck-Hughes	120	25,828	11,739.2	242,670	1,011	610
Wright-Hargreaves	150	20,669	13,596.7	280,938	1,158	727
Total	480	96,359	47,474.6	981,342	4,331	2,626
Recovery from Nickel-Copper refining			178.6	3,605		
GRAND TOTAL	5,417	1,182,820	474,955.7	9,818,073	80,073	48,286

Silver recovered was 2,958,900 ounces. Apart from nickel sulphate and the bulk of the nickel oxide (962,914 lbs.) which were shipped by nickel refineries, all the cobalt and nickel compounds as noted in the table were marketed by silver-cobalt refineries in Southern Ontario. At Deloro an insecticide plant has been erected for the utilization of the arsenic recovered in refining operations.

Nickel-Copper.

The market for these metals is overstocked. Electrolytic copper declined in price from 18.45 cents per pound for the first 9 months in 1920 to 12.30 cents for the corresponding period this year. Nickel supplies which have accumulated since the close of the Great War have not yet been absorbed. In consequence of these unfavorable conditions production of these metals has been greatly curtailed. The ore smelted at Copper Cliff, Coniston and Nickelton totalled 319,967 tons from which 17,013 tons of nickel-copper matte were produced. Matte shipments to Canadian refineries were 6,069 tons, to Great Britain 5,608 tons, and to the United States 1,403 tons. There were 5,558 tons of matte treated in the refineries at Port Colborne and Deschenes, the products being electrolytic and blister copper, nickel oxide, nickel sulphate and metal, also gold, silver and metals of the platinum group.

Iron Ore, Pig Iron and Coke.

Apart from a 22-ton sample lot of hematite from the Wallbridge mine near Madoc, and 27,753 tons of nodulized siderite shipped by the Algoma Steel Corporation from the Magpie mine to Sault Ste. Marie blast furnaces, there were no shipments of iron ore. The shipment was from stock pile, the Magpie mine having been closed down since March 9th.

During the period seven blast furnaces were in operation as follows:

Company	Location	Furnaces operated	Average time, days.
Algoma Steel Corp.	Sault Ste. Marie	3	173
Steel Company of Can.	Hamilton	2	190
Canadian Furnace Co.	Port Colborne	1	94
Midland Iron & Steel Co.	Midland	1	41

A total of 537,475 tons of iron ore were smelted, of which 109,227 or 20.9 per cent was of Ontario origin. Pig iron produced totalled 393,303 tons valued at $9,936,597. Of this quantity 230,857 tons in addition to 176,666 tons of old material were used in steel making, the output of steel being 364,602 tons valued at $13,056,376.

The Algoma Steel Corporation operates 160 and the Steel Company of Canada 80 by-product coke ovens, using imported coal. The total coke consumed by Ontario blast furnaces was 421,434 tons valued at $4,114,118. By-product ovens were charged with 593,359 tons of coking coal worth $3,989,531. The coke product was 390,717 tons worth $4,054,196 and the total value of by-products was $1,006,055.

MINING BROKERS AND "BLUE SKY."

President J. P. Cannon, of the Standard Stock Exchange, Toronto, gives the views of that organization on certain points connected with the administration of "Blue Sky" law.

In the course of collection of information respecting measures that should be taken for the protection of investors, a reply to questions submitted by A. H. O'Brien on behalf of the Ontario Government has been given by President J. P. Cannon, of the Standard Stock and Mining Exchange. The answers indicate a desire for reform, including the appointment of commissioners to administer a blue sky law, the prompt listing of securities after the sale of stock, and precaution for the protection of prospectors. The licensing of agents or persons who sell securities is favored, and it is urged that agents should be responsible parties.

The questions and answers are as follows:—

Licenses Favored.

(1) Is it advisable or otherwise to license agents or persons who sell securities? If so, are there any restrictions which should be applied to a license?

Yes; both dealers and agents should be licensed. A dealer should be a member of some organized Stock Exchange operating under a Canadian charter. Agents should be responsible parties working for such dealers.

Percentage for Promoters.

(2) What is the lowest percentage in mining, gas

and oil proposition (presumably upon the price the stock is selling at) that it is reasonable or possible to pay as commission to (a) salesman, (b) promoter, (c) prospector, (d) for advertising?

As very few of the members of this Exchange are "promoting brokers," we find it difficult to state a definite percentage. However, based on information obtained through inquiry from specialists, we would say that a minimum of 25 per cent. of the money raised would be required for successfully floating natural resource companies; this 25 per cent. to cover remuneration to sub-agents, advertising expenses and promoter's profit. We would suggest, however, that the prospector, who usually receives stock for his property be allowed to sell a portion of his stock along with the Treasury stock of the company; say, on a basis of three shares of treasury stock to one share of prospector's stock. Stock could all be deposited in escrow with the trust company, with instructions from all parties concerned to issue stock in this proportion.

Commissioners Needed.

(3) In your opinion would one commissioner be sufficient to administer a blue sky in connection with stocks for industrials, mining companies, etc.?

In our opinion there should be three commissioners to deal with natural resource companies. One should be well qualified from a business and financial standpoint to judge of the matters coming before him; another should be a man well trained and versed in the operations of mining companies, and who has a lively sympathy in the development of Northern Ontario from a mining standpoint; in fact a person who knows the mining business from the top to the bottom; and the third should be a man capable of interpreting the legal aspects of the act.

Would List Securities.

(4) Do you consider that when a company proposes to sell stock in a Province its shares should be listed? And when do you think shares should be listed?

When the original amount of money authorized by the commissioner has been raised by the sale of treasury stock, the stock should be listed on some recognized Stock Exchange. This should be done for the protection of the shareholders. It would prevent the promoter from arbitrarily putting a higher price on the stock, in which the shareholders could not participate.

Transfer Agent Here.

(5) Is there any advantage in compelling companies selling mining shares to have a transfer agent in Ontario through whom all transfers of stock must be made?

We deem it advisable to include a section in the act which would render it necessary for all mining companies selling shares to the public to have a transfer agent in Ontario, through which all the transfers of stock must be made, and the transfer agent should consist of a recognized trust company. Such a provision would do away with the over-issuing of stock by a company.

When Is a Speculation?

(6) It being admitted that many enterprises, including mining, are speculative, is there any valid reason why a statement should not be printed on all advertising matter, certificates, etc., to the effect that "this is a speculative security," or some similar wording?

As, in our opinion, a certain element of speculation enters into the purchase and sale of all securities, we cannot see how the Government proposes to define that certain stocks are always speculative, and that certain other stocks are always investments, nor can we see how the Government proposes to designate where speculation ceases and a status of investment begins. The mere fact that a company pays dividends does not cause it to cease to be speculative, as, for instance, C.P.R., which has sold up to $280 per share and down to $106 per share without any change in its 10 per cent. dividend. The public are quite aware that in some degree a new issue is more speculative than one which has been quoted on the open market for some considerable time, and if, in the opinion of the Government, any marking is required we would suggest that the words "new issue" would fully meet the requirements of the Government in this particular section of the proposed act. The words "new issue" to be only printed on securities sold on flotation and prior to listing on the exchange.

Protecting Prospectors.

(7) What provision, if any, do you consider should be inserted?

As in our opinion the natural resources of Ontario are only in the initial stage of development, the natural resource companies should deal with as leniently as possible as commensurate with the objects of the act. The development of this great source of revenue to the Government is absolutely dependent upon the prospector, and he must be guaranteed a living wage: he cannot possibly be expected to wait for perhaps a period of five years for his property to make good before he receives anything from the company which is developing his property.

Any and all penalties that the proposed act may impose should be upon the officers of the company and not upon the company itself (to the extent of precluding the sale of the company's stock in Ontario to the detriment of the company's shareholders), as it is, to our mind, a rank injustice that the wrongful acts or the neglect of the officials of a company or their agents should be allowed to, in any way, jeopardize the marketable value of the holdings of innocent bona-fide shareholders who practically have no control of the company in which they hold stock.

GOUDREAU GOLD MINES.

A telegram to the Toronto Mail and Empire announces that Clem Foster, head of the Goudreau Gold Mines, was a visitor in the city and was officially welcomed by the Board of Trade council at luncheon. Mr. Foster told Board of Trade members that there were prospects of several large mining camps being established in Goudreau in the next year, including his own, on which $200,000 was being spent in development. Local business men will accompany him back to Goudreau on Wednesday by special car, the guests of the railway, to make an inspection of the new camp and to establish business connections with the "Soo."

BAILEY CUSTOM MILL

The gross earnings of the Bailey Custom Mill for November were approximately $12,877, according to a report just issued by the Bailey Silver Mines, Ltd. The Bailey mill treated 4,292.63 tons of ore during the month and the mine shipped 1,183.18 tons of ore to the mill.

B. C. MINING NOTES.

Pacific Coast Mines Sold.

The Suquash and Morden Mines of the Pacific Coast Coal Co., Ltd., situated on Vancouver Island, have been sold to E. R. Ross for $316,100. They were put up for sale by Order of the Court, the auction being conducted by Sheriff Trawford, of Nanaimo, B.C. The money was to be paid practically in cash, 10 per cent. on the spot and the remainder on Monday, November 28th. The receipts will be devoted to the defrayment of a number of charges, one of the first of which is some $68,000 owing to the coal miners of Nanaimo and Wellington districts in wages. Mr. Ross has refused to make a statement as to whom he represented. It is assumed, however, that it is the intention of the new owner, or owners, as soon as a clear title is obtained, to proceed with the operation of the mines and plant at Morden and with the development of the Suquash property. The latter is situated considerably further north on the east coast of Vancouver Island. As yet this field has been comparatively little developed, and should, judging from engineer's reports, ultimately prove to be one of the important producers of the Province.

Institute Meeting at Cumberland.

At a meeting of the district branch of the Canadian Institute of Mining and Metallurgy, held recently at Cumberland, B.C., addresses were delivered by J. D. McKenzie, chief geologist of the western division of the Dominion Geological Survey, on coal formation; by Col. J. E. Leckie, chairman of the western division of the Institute, on the aims and objects of the Institute; and by Nichol Thompson, chairman of the Mining Bureau of the Vancouver Board of Trade, on the mining industry. There were talks also by Prof. Turnbull, University of B. C.; Prof. R. W. Brock, Dean of the Faculty of Applied Science, University of B.C.; and Professors Schofield, Freeman and Williams. Thos. A. Graham, district superintendent of the Canadian Collieries (D) Ltd., welcomed the visitors, and described working conditions in the coal mines of Vancouver Island, the problems connected with the operation of the mines, and the future of the industry. A considerable party was made up by the visitors and others for the purpose of inspecting Number Five Mines, Canadian Collieries, and the mine plant and general equipment of that section. The meeting generally was a pronounced success, all members of the Institute profiting by the experience both in point of instruction and of entertainment.

Pouce Coupe.

The Imperial Oil Company, after a short shut down of over a month in a successful effort to control a gas pressure unprecedented in the history of drilling on this continent, has re-opened operations in the Pouce Coupe River bottom, near Rolla, B.C. It is said that the feat of controlling this pressure to permit of the resumption of drilling will stand unique in the history of petroleum development. At first the gas was light and fairly dry, but the oil content, it is stated, has been increasing constantly, until now what is described as gasoline is being forced from every joint in the casing.

BRITISH COLUMBIA COAL OUTPUT.

Present prospects are that the total coal output for British Columbia in 1921 will fall short of the production of the previous year. In 1920 the coal mined in this Province totalled 2,696,774 tons, of which 101,649 tons were used for coke making purposes. This year, up to the end of the month of October, the output was 2,160,000 tons, as compared with 2,295,000 tons for the same period in the last twelvemonth.

These figures clearly show that the collieries must make a greater production in November and December than was done in 1920 to reach 1920 totals. It should be understood, in considering this possibility, that the two last months of the previous year saw the operators working almost at top notch, while 1921 finds the industry anything but in this position. The reason for the difference cannot be definitely pointed out, although it may be ascribed generally to industrial slackness, and to some extent specifically, as far as the British Columbia market is concerned, to the competition of cheap imported fuel oil. There does not appear to be much chance, therefore, that the final totals for 1921 will be equal to those of 1920.

The statistical details up to the end of October, both for 1920 and 1921, together with some notes on conditions in the producing coal fields of the Province, are appended:—

Coal Output to End of October, 1920 and 1921.

Year	Crow's Nest District.	Nicola-Princeton District.	Vancouver Island.	Total
1921..	622,000	154,000	1,384,000	2,160,000
1920..	706,000	125,000	1,464,000	2,295,000

The coal output recorded to end of October, 1921, is 2,160,000 tons, as against 2,295,000 tons for a similar period in 1920.

Crow's Nest Pass District to above date shows a decrease of 84,000 tons, of which at least 80,000 tons is due to the fact that Corbin Coal and Coke Co. has been operating on a reduced scale.

The Nicola-Princeton District has reported an output of 154,000 tons in the first ten months of 1921, as against 125,000 tons for the same period in 1920; the Coalmont Collieries being responsible for the greater part of the increase.

Vancouver Island.

The Western Fuel Corporation of Canada has reported 504,000 tons up to the end of October, 1921, a decrease of 66,000 tons as compared with 1920, when in a similar period this company produced 570,000 tons. tons.

The total output reported by the Canadian Collieries is practically the same to date as last year, 615,000 tons.

The Pacific Coast Coal Mines, which, in 1920, produced 94,000 tons, has not operated during 1921.

Nanoose Collieries have increased from 32,000 tons in 1920 to 42,000 tons in 1921.

Granby Consolidated M. S. & P. Co. has done much to balance the output of 1921 against 1920, as they have produced 222,000 tons this year as against 150,000 for a similar period in 1920.

The Island Mines, during November, have been working irregularly, and it is unlikely that the last two months of 1921 will produce sufficient coal to permit the output of 1921 to equal that of 1920.

THE MINE MANAGER.

Interesting Sketch In Toronto Newspaper Of The The Personality And Duties of Mr. De Pencier, Manager of the Dome Mines.

[The Toronto Telegram is to be congratulated on the following sketch, written we understand, by a member of its staff, which appeared in its columns recently. Ed. C.M.J.]

The knowledge which people possess in general of the big mines up North is very impersonal. Nearly everyone is familiar with the names Hollinger, Dome, McIntyre, and have an approximate idea of where they lie. Some who hold or have held stock in these respective properties know what dividends they pay, what capital they possess, and are probably well posted in their plans and prospects as far as can be known from shareholders' reports. But it is always of the mine that information is sought. Little is known or cared about the men who are behind the scenes—the mine managers. It is the same remote interest which a man might show who asks of a ball game, "Who won?" without caring about the pitcher or any of the players.

The Mine Manager.

Back of the directors' board room and a long way from the broker's ticker is a man who has a set job. His job is a profession, an honorable profession, and his task is a constant combat with mother earth to make her reveal her treasures and yield them up with a minimum amount of treasure put back into into her. He is on his job ceaselessly, he is the central brain where all the numerous sense nerves register, the dominating figure, whose judgment and drive are behind the whole giant system, which man has devised to wrest gold from its rocky beds beneath the ground.

The Person Behind.

One reads in the paper every day of strikes being made, new veins tapped, rich ore encountered, cross cuts, drifts, stopes and what not, and one gets the impression that a mine is something which runs automatically, or that workmen are constantly digging everywhere for fresh funds of gold, much as some people imagine that a newspaper is something which has reporters running about the street in constant quest of news. A half hour spent with the manager of one of the big mines, that is a half hour, including the incessant interruptions of such managers, clerks, foremen and heads of different departments is a revelation as to the organization of a mine and the responsibility of the manager. It also reveals the fact that there is a human personality holding the ends of all the different wires. Such a half hour your correspondent spent with Mr. De Pencier, the manager of the Dome Mines.

A Canadian Graduate.

Mr. De Pencier, as the name would indicate, is of French extraction, but a long way back. He is of U.E. Loyalist stock, settled in Ontario, but his home he claims now as Vancouver. He is only 46 years of age, young for a mine the size of the Dome, but his experience was gained at an early age. Before ever entering university he was prospecting in B.C., was all through the Rossland rush and saw as a boy the trail of '98. So he knew a good deal about gold besides the laboratory specimens when he entered McGill University in 1898. On graduation in 1902 he put an extra year on research work, then in 1903 hiked for the Ra

Globe-Trotting Gold Miner.

There is one thing common to all gold miners. The world is a small place, and they speak of taking a trip over to South Africa or Australia much as the laity would speak of taking a trip to Port Credit or Newmarket. And they are the most cosmopolitan and interesting people to meet, for they are in live touch with international affairs, all over the world. It is significant of the youth of the mining industry in Canada that in almost all outside countries the mining engineer has a much higher comparative social status than in our own. Forty or fifty years from now perhaps Canada, too, will arouse to a realization of the importance of her mining industry, and accord the same esteem to the men who are now quietly building it up. In the meantime it is instructive to listen to these men who have seen the sights and the greed of gold in other lands.

Wide African Experience.

Mr. De Pencier spent about seven years on the Rand on gold properties. The outstanding feature of the Rand, and it is comforting to have the truth from a travelled Canadian, is not their high value, but the uniformity of their values. All the mines there he states, are on a rugged reef, which dips. The first mines were staked and worked on the outcrops of the reef. Then diamond drills were put down to locate the reef where it dipped below the surface. Other mines commenced operations by sinking vertically twelve to fifteen hundred feet before the reef itself was reached. Once the ore-carrying reef was entered, values were so safe and reliable that engineers did not bother to diamond drill to block out the extent of their ore body. They just started to work to take it out. On of the most recent mines there sank 7,000 feet of dead shaft before the reef was reached. One would suppose that this was the height of mine gambling, but, according to Mr. De Pencier, the huge mining firms did not hesitate to sink millions in the ground before they took a penny out, the values in the reef being sure once they were reached. This is obviously a different crowd of mining people to the majority of those who sink a shaft a couple of hundred feet in prospects in Northern Ontario, and then close down for the want of capital to go further. The unions in South Africa are, however, shoving expenses up to the peak at present, and whether some of its capital will be attracted to Ontario's north will probably depend on the volume and continuance of the few leading mines here. The Hollinger and Dome are setting a pace here which is sure to draw attention to our gold district, particularly as the control of most of the Rand mines is not so far away as South Africa, but is held in England. The recent visit of Sir Archibald Mitchelson, partner of the late Lord Rhondda, and his favorable comments on the Ontario gold fields in London papers is sure to bear fruit. Only three weeks ago the Kingston claims in Shining Tree were turned over to an English syndicate, which shows that some of them have their scouts in the field now.

Africa To Canada.

When Mr. De Pencier returned to Canada from the Rand he went up north quite naturally with the early discoveries, and was on the Reddick mine, Larder Lake, before going on to Porcupine. In 1912 he relieved Mr. Meek on the Dome, and has remained there ever since, working up to his present post of general manager. His assistant, C. W. Dowsett, an English mining graduate, also came to the Dome from South Africa. He is one of the best mill experts on the continent, and is now general superintendent and metallurgist.

He is a few years younger than Mr. De Pencier. It is a village of its own which they rule over at the Dome mine, with its neat commodious houses, its stores, its hockey rink, its recreation room and countless office buildings, all hewn out of the bush, which eleven years ago covered the entire district.

Northern Ontario Letter

THE SILVER MINES.

Nearing 200 Million.

The silver mines of Northern Ontario will have a production record of 200 million dollars before the end of the first quarter of the coming year. In this issue of the Journal will be found a summary of annual output together with estimates for 1921. It will be noted that the dividends paid by the successful silver mining companies, together with the ease in the various treasuries, amounts to well over 50 per cent of the gross yield.

Alladin-Cobalt.

Announcement is made officially to the Journal that the office of the Aladdin-Cobalt has been removed to the Tough-Oakes mine at Kirkland Lake. The operation of the Chambers-Ferland mine of the Aladdin-Cobalt which was carried on through the shaft of the Right of Way Mines has been temporarily suspended.

La Rose.

The work of deepening the workings on the Violet property of the La Rose Consolidated is under way and the management is hopeful of adding to the amount of developed ore. The Violet has come to be regarded as the backbone, so to speak, of the La Rose holdings in Cobalt.

Operations are being conducted on a limited scale at the 9th level of the Kerr Lake mine. Some raising has recently been done, but the results have not been very satisfactory. The company continued to disburse dividends during the year 1921 from profits realized as a result of the operation of property in Utah and in New Zealand. There is a substantial quantity of low grade ore remaining in the Kerr Lake dumps, but the handling of this will not yield very great profits until such time as the cost of labor and supplies undergo further declines.

Victory Silver.

Promising results are being met with on the property of the Victory Silver Mines, formerly known as the Hylands property. Surface work uncovered a vein about 26 inches in width, along which some extremely rich pieces of "float" were found. It is believed that an ore shoot occurs at some point along the vein and that it may only rise to surface in a limited section of the vein at some point where trenching cannot be done on account of the overburden. Lateral work is being done at a depth of 185 feet, where the vein is exceptionally strong and uniform, without finding commercial silver values as yet.

Silver in Gillies Limit.

An encouraging amount of silver has been found recently on the Cobalt-53 property, situated in Gillies Limit. Further work will be required before the importance of the development may be determined.

Nipissing.

It will be another week before the official statement may be secured showing silver production during November from the Nipissing mine, but it is generally understood to have exceeded 300,000 ounces.

The Price of Silver.

A disappointing feature of the silver mining industry is that in spite of talk about the possibility of bimetallism, yet the price of silver has undergone a recent decline. This would tend to indicate that whatever hope may have been entertained for the remonetization of silver no longer exists, and that the monetary situation of the world may be straightened away without substituting silver as metallic support of paper currency in some fixed ratio to gold.

Haileybury Frontier.

It is estimated in mining circles in Cobalt that the working option which the Mining Corporation of Canada has taken on the Haileybury Frontier property in South Lorrain is based to a great extent upon the favorable prospects of the Wood's vein on the Keeley mine extending across the boundary onto the Frontier.

Silver Discovery in Gowganda.

Another discovery of silver is reported to have been made recently in the Gowganda district, in the township of Van Hise. The discovery was made on a small claim or "friction" which had been previously overlooked, lying adjacent to the Sanderson property. High grade silver ore occurs at surface, but the importance of the discovery will only be determined by further work.

To Resume Work at Castle Mine.

Reports reaching Elk Lake tend to indicate that the Trethewey-Cobalt Company will re-organize so as to provide funds for carrying on work on the Castle property in Gowganda. Preliminary work has already commenced in connection with resuming work. The equipment is being gone over, and it is believed an effort will be made to have development work under way early in the new year.

Asbestos at Rahn Lake.

An examination of asbestos properties at Rahn Lake is being made and there are good prospects of a deal being put through which would assure aggressive operation of the property by mining men who are already engaged in the asbestos mining industry. The deposits lying at Rahn Lake in the vicinity of Mt. Sinclair are said to be extremely promising and their successful operation is believed to lie in a solution of transportation difficulties.

THE GOLD MINES.

Goldtellurides.

Among the more favorable news in the Porcupine gold area is the development of extremely rich ore on the Dome Mines, some of which has the appearance of "pressed mud." No official statement has been issued, but the Journal representative has consulted the opinion of mining men with experience in mining gold tellurides, and the impression is gathered that the "pressed mud" is in reality a leached out tellurides ore, and that this material may be found to lie at the apex of a big deposit of gold tellurides. By a quite remarkable coincidence, W. E. Simpson, manager of the Miller Independence Mines, wrote a special article for a Northern Ontario paper in which he discussed the subject of tellurides in West Australia. It is interesting to review the following remarks by Mr. Simpson:

"A perusal of all the recently published information, however, would lead to the belief that the tellurides in Ontario, where discovered, appear suddenly and unexpectedly whereas, in Western Australia, what at depths proved to be some of the greatest telluride gold deposits

ever discovered, showed on the surface no trace of tellurium whatever, the change taking place gradually from one ore state to the other. The most noticeable alteration was that of color, the ore being brick-red, at the surface, the result of ages of oxidation, and gradually charging through the various shades of yellow, brown and gray to the well known usual variety of colors, characteristic of rock formation throughout the world below the zone of surficial influences, frequently called "the permanent water level."

"Similarly, the minerals of economic value in the ore were found to have steadily changed in chemical composition, the gold, "free-milling" and almost pure at the surface giving place to bright grey and black combinations with varying percentages of tellurium, silver bismuth, lead, mercury, etc., which go to form calaverite, petzite, sylvanite and the other tellurides with compositions that are all very wel known.

"In the intermediate zones there were frequently found quantities of a soft, earthey material, dry as dust from the waterless nature, of that desert country and coated with a spongy substance to which the name "mustard gold" was given and which although assaying highly was amenable only with great difficulty to the simple methods of treatment by amalgamation and percolation with cyanide then in operation.

"Microscopic examination showed that the sponginess must have resulted from countless geological ages of leaching of the tellurium, silver and other oxidizable elements with which the gold undoubtedly had been originally associated. Continued observation of each succeeding zone proved the correctness of the suppostion, the soft yellow material in the oxidized ore gradually changing to a greyish mineral containing tellurium in a partially oxidized form and rich in gold, but which with each increase in depth, became increasingly difficult to treat."

Schumacher.

The deal for the Schumacher property is said to be making fairly good progress, but official advice is still withheld. The fact that on the adjoining Hollinger mine there is a "drag" in the mineralization toward the east tends to add to the merit of the Schumacher, and offers good possibilities of the property having important ore bodies at depth.

Dome Section Attracting Attention.

While the Hollinger-McIntyre section of the Porcupine district is far in the lead as regards production to date and ore reserves blocked out, yet the manner in which the Dome Mine is developing and the evidence of ore on other properties is encouraging the belief that the so-called Dome section may ultimately be found to also have very widespread mineralization. The favorable developments on the Premier Paymaster are pointed to, while the outlook is promising for the consolidation of the Dome Lake with the West Dome, together with good prospects on such properties as the Preston East Dome, Clifton-Porcupine, Porcupine Imperial, Ankerite, Maidens-Macdonald, etc.

Blue Diamond.

Reports reaching Timmins go to show that the Blue Diamond Coal mine in Alberta is realizing encouraging profit, one report having it that a profit of approximately $1,000 is being shown daily.

Davidson.

At a depth of 600 feet on the Davidson property, drifting is beng carried along a vein which contains average values of $10.60 per ton, according to official advice given out. The company is said to be well financed and in a position to erect a large mill provided the developments continue favorable.

McIntyre.

Net profits on the McIntyre-Porcupine have recently rised to close to $100,000 monthly. There are approximately 350 men on the pay-roll and the physical condition of the mine is steadily improving.

Teck-Hughes Reorganization.

Some criticism has developed in respect to the reorganization scheme of the Teck-Hughes Gold Mines. In a fairly general way, however, the scheme is meeting with favor. Two objections raised are that the circular sent out did not contain any information in regard to the amount of ore in sight nor the amount of money on hand, and that the increase in capital is not justified in view of the issue of new bonds amounting to $600,000. This criticism seems to miss the point that the holders of bonds are to be permitted to take up stock and pay for it with bonds, and that the indebtedness may reasonably be reduced approximately $250,000.

Tough-Oakes Coming Back.

Developments at the 500-ft. level of the Tough-Oakes Mine of the Kirkland Lake Proprietary (1919), Ltd., have been very favorable during recent weeks, and there are good prospects of sufficient ore being developed to assure steady operation of the mill not later than during the coming spring. The Tough-Oakes produced gold at the rate of $60,000 monthly prior to becoming involved in litigation and finally handicapped by the economic condition caused by war. The better ore shoots were mined-out and the property was left in a very weak physical condition. However, as announced recently in the Journal, a thorough study of the geology of the property was made late last summer and the problems have been largely solved. As a consequence of this, the development work now being done is steadily "bringing the mine back."

Activity in Lebel.

Cold weather has frozen the surface of the ground, and snow now lies in sufficient quantity to make excellent sleighing in the mining districts of Northern Ontario. This is a big help to transportation in the outlying districts and, as in the case of Lebel township, the activity during the present winter is gathering increased momentum.

At the time of writing, the cross-cut at the 400-ft. level of the Bidgood property has not encountered the vein, although this is expected almost daily.

Success in a big way on the Bidgood, King-Kirkland, Queen-Lebel, or any one of the various new properties which are looking better with every blow being struck, would probably go a long way toward encouraging more capital to come into use in this exceptionally promising part of the Kirkland Lake district.

Skead.

Winter roads have encouraged an increase in work in Skead township where property owners cling to optimistic views with respect to prospects in that area, and where numerous promising showings of gold are in evidence.

Gold Nugget.

Advice direct to the Journal representative from the Wanapitei Lake district carries the information that on the Gold Nugget property, a vein about 34 feet in width has been opened up on surface and arrangements are being made to sink a shaft to a depth of 150 feet. A mining plant is being installed this winter with a view to expediting the work. The foot-wall side of the vein is very rich and by sinking the shaft in this ore it is hoped to get sufficient gold from the operation of a two-stamp

mill to pay for work. At a depth of 150 feet it is planned to cross-cut the vein so as to ascertain the average gold values in the quartz and schist body.

Goudreau.

C. A. Foster is proceeding with plans to operate the Porter property in the Goudreau gold area. Quite a number of business men of Sault Ste. Marie have paid visits to the property and are understood to be interesting themselves in helping to finance the enterprise. Surface showings are favorable.

Hollinger.

The Hollinger Consolidated recently treated 4,700 tons of ore in 24 hours. This does not represent the average, but it does greatly exceed the former record of 4,200 tons daily and tends to indicate that for the month of December the average will be upwards of 4,000 tons daily. The increase has been brought about by crushing the ore extremely fine before letting it pass through the stamps.

Porcupine V. N. T.

Directors of the Porcupine V. N. T. have entered into a deal for the sale of the remaining 475,000 treasury shares at 15 cents per share. The shareholders will be asked to ratify the deal at a meeting to be held Dec. 28th. This would provide upwards of $70,000 and would be sufficient to continue the main shaft from a present depth of 600 feet to the 1000-ft. level. There are prospects of interests in this country making a bid to secure control of the company, in which event a scheme would be entered into to raise sufficient money to finance the construction of a large mill provided the developments down to the 1,000-ft. level proved to be up to present optimistic expectations.

TORONTO MINING QUOTATIONS.

Quotations on Active Stocks on Standard Stock Exchange, Toronto, 13th December, 1921.

Silver			
Adanac Silver Mines, Ltd.	1¼	1	1
Beaver Consolidated	24½	23½	24
Crown Reserve	9³/₄	7	9³/₄
Coniagas	1.34	1.35	1.35
Gifford	⅜	⅜	⅜
Great Northern	1	1	1
Kerr Lake	3.50	3.50	3.50
La Rose	32¼	31¼	32
Mining Corp. of Can.	1.05	1.00	1.00
Nipissing	7.00	6.65	7.00
Ophir	⅝	⅝	⅝
Peterson Lake	5	5	5
Temiskaming	25	25	25
Trethewey	10	9	9¼
Gold.			
Apex	1¼	1	1
Atlas	13	6⅞	6⅞
Boston Creek Mines	9	9	9
Dome Extension	71½	71	71½
Dome Mines	21.60	20.60	20.95
Gold Reef	1³/₄	1⅝	1³/₄
Hollinger Cons.	7.85	7.85	7.82
Inspiration	3	3	3
Keora	10	8	9
Kirkland Lake	32½	31³/₄	31¾
Lake Shore M. Ltd.	1.21	1.19	1.21
McIntyre	2.00	1.96	1.99
Moneta	8	7¾	7¾
Porcupine Crown	13¾	13	13
Porcupine V.N.T.	19½	16½	17¼
Schumacher	29	24½	28½
Teck-Hughes	16	15	15¾
Thompson Krist	2½	2½	2½
West Dome	6½	6½	6½
Wasapika Gold M. Ltd.	3½	3	3
Miscellaneous.			
Petrol Oil	17½	17½	17½
Vacuum G.	2	2	2

METAL QUOTATIONS.

Following are the fair average prices for ingot metals (in less than car-loads) at Toronto:

	6th Dec.	13th Dec.
Copper, Electric	17	18½
Copper, Casting	16¾	17¾
Tin	35	38½
Lead	6¾	7
Zinc	7½	7½
Aluminum	27	27
Antimony	9	9

TORONTO COAL PRICES

Toronto, Dec. 13.—There is no very appreciable change in the coal situation in Toronto. It has, perhaps, improved slightly in this way—that there is less coal under demurrage in Toronto than formerly. But market conditions are much the same, with the exception of the fact that slump is not so plentiful as it was. Altogether, coal men are the very reverse of optimistic. So far as they are concerned, a heavy snowstorm would suit their book better than anything else at the moment.

U. S. PRODUCTION OF COAL

Production of soft coal continues to plunge downward, and during the week ended December 3 touched the lowest level reached at any time since last April. The total output, including lignite and coal coked, was approximately 7,077,000 net tons. The daily rate—1,179,000 tons—showed a decrease of 16 per cent. in comparison with the rate in Thanksgiving week. In comparison with production in late October, the decrease was 36 per cent. The present slump is in large part a reaction against the artificial stimulus let by the apprehension of consumers over a possible stoppage of transportation. While that apprehension was felt, coal was flowing into storage. Now that it is for the moment allayed, coal is flowing out of storage. How acute is the present depression may be judged from the fact that the output of 7,077,000 tons was the smallest in any full-time week since that of April 30, when 6,984,000 tons were produced.

THE MINING CATALOG.

The Keystone Consolidated Publishing Co., Pittsburg, has published the initial issue of the "Mining Catalog," metal and quarry edition. This is a splendid book, containing much useful data. The publishers have aimed to make it a distinct contribution to the working library of operating companies. It is a sister volume to Coal Edition, Mining Catalog, which is already well known in the coal districts. The concerns represented in the catalog provide its entire support and the publishers make free distribution to individuals and companies in the mining and quarrying industries. It is a consolidated catalog in which a large number of firms advertise their products. A considerable part of the book is devoted to engineering data.

DEVELOPING GOLD PROPERTY IN MANITOBA.

It is stated by the Financial Times, of Montreal, that Montreal and Toronto financial circles have been giving a good deal of attention recently to gold mining activities in various sections of the Dominion. The great success that has already attended many of the operations in the Canadian gold camps is advanced as one of the principal reasons why Canadians are willing to devote so much consideration to the new mining developments. In addition to the renewed activity in the Porcupine district, Winnipeg reports that a number of Canadian and American engineers are going into Elbow Lake district, about 50 miles from The Pas, and securing options on various claims.

Hollinger interests are reported to have an option on some first choice areas in the new gold region where surface conditions are more or less sensational. It is understood that another Montreal syndicate has secured options on properties in the same mineralized zone. Recent private advices received from the district indicate that there is considerable excitement over the discovery and that all available properties likely to share in the wealth have been eagerly acquired.

S. W. Cohen, the well-known mining engineer, has visited the Elbow Lake district, and his reports on surface conditions were favorable. He has disposed in part of the option he held to the Hollinger interests, and some adjoining blocks to another local syndicate.

The properties, located by the Murray brothers, are about fifty miles from The Pas. General Manager Brigham has detailed a member of the Hollinger staff to superintend the preliminary work, for which equipment will go forward at once. It is not expected to make much progress at surface during this winter. If the initial results are sufficiently encouraging diamond drilling probably will be resorted to next year.

Last spring, or early summer, the Murray brothers made what was heralded as a spectacular find, some fifty miles northeast of the Flin Flon. Free gold and a large mineralized section promised what the prospectors assumed to be a great high grade mine. Commissioner Wallace, on behalf of the Manitoba Government, verified original reports.

Mr. Cohen speaks reservedly because of his personal share in the transaction. He recommended thorough trenching and sampling, and enough diamond drilling to determine the nature of the structure. In a mineralized zone resting on secondary granite, metamorphosed rocks, greenstone, porphyry, syenite and other features are exposed, iron pyrite predominating, and free gold existing throughout what quartz there is. Across about 400 feet, and for a distance of 3,000 feet along the strike, the zone offers tonnage and a payable grade, when the factor of depth is assured. Seemingly the gold is generally affiliated with the quartz, for wherever there is quartz, there is gold, otherwise the section is lean. So far as noted, there are no defined veins. The values are contained in bunches of quartz and veinlets lying horizontally.

Mr. Cohen does not attribute the enrichments to secondary or surface deposition. Some of the quartz exposures are from ten to twenty feet wide, and it is in those that values ranging from the payable to the pyrotechnic were secured by Mr. Cohen, who merely states that "if it will average it is the greatest thing of its kind I know of. The quartz bunches and veinlets, or stringers, lie flat. This condition may continue with the varying results characteristic of such occurrences. At any rate, the find is important—and the thing deserves the treatment it will receive."

THE ADVANTAGES OF AIR RE-HEATING.

By F. A. McLEAN.

When compressed air is to be transmitted for appreciable distances, particularly out-of-doors, as in mining, quarrying, shipbuilding, etc., the use of an air re-heater is highly desirable, as through its use losses in transmission and shut-downs, due to freezing troubles, are largely eliminated.

Owing to the heat developed in compression, compressed air in the majority of plants enters the pipe lines at a much higher temperature than that of the surrounding atmosphere. By radiation in transmission, however, its temperature is greatly reduced, with a corresponding reduction in its volume, and, therefore in its working capacity.

A re-heater placed as closely as possible to the point or points of use will raise the temperature of the air to about 250 deg. F., increasing its volume with proportionate gains in its capacity for doing work.

Broadly speaking, the use of re-heaters not only eliminates any chance of the moisture—always present in the air—freezing in the exhaust ports and clogging the tool, but also increases the capacity of the plant 20 to 30 per cent. with a very insignificant increase in fuel cost, and no more attention than that required by an ordinary stove.

The most common form of re-heater consists of a cylindrical cast iron body constructed with an inner and outer shell, the outer shell being covered with non-conducting material surrounded with a sheet iron mantle to prevent heat loss.

The air enters the top of the re-heater and is forced in a thin film between the inner and outer shells, passing out at the bottom into a short pipe line and thence to the tools. The inner shell, over which the air passes, is heated by the combustion of coal, coke or other fuel, to a temperature necessary to heat the air to about 250 deg. F.

PERSONALS.

The Toronto branch of the Association of Women of the Mining Industry will meet this week at the residence of Mrs. Geo. E. Silvester.

Dr. E. S. Moore, secretary of the geological section of the American Association for the Advancement of Science is in Toronto for the meeting of the Association. Dr. Moore, who is a University of Toronto graduate, is Dean of the School of Mines, Pennsylvania State University.

Mr. A. L. Mudge and Mr. A. G. McMaster of Toronto have been engaged to assist Mr. J. G. Kerry in investigation of water powers along the Ontario Government Railway, which serves the gold and silver mines.

THESE SHOW AN INCREASE

Gold, platinum metals, lead and pig iron are the only metals which show an increase in production in the Province of Ontario for the first nine months of 1921, as compared with the corresponding period last year.

The Canadian Miners' Buying Directory.

Acetylene Gas:
Canada Carbide Company, Ltd.
Prest-O-Lite Co. of Canada, Ltd.

Acetylene Welding:
The Toronto Iron Works, Ltd.

A.C. Units:
Powley & Townsley, Limited.

Agitators:
The Dorr Co.
Can. Chicago Bridge & Iron Co., Ltd.
Horton Steel Works, Limited.

Air Compressors:
Belliss & Morcom, Ltd.
Laurie & Lamb

Air Hoists:
Canadian Ingersoll-Rand Co., Ltd
Mussens, Limited.

Air Receivers:
The Toronto Iron Works, Ltd.

Alloy and Carbon Tool Steel:
Peacock Brothers Limited.

Alternators:
MacGovern & Co.

Aluminium:
Spielman Agencies, Regd.

Amalgamators:
Northern Canada Supply Co.
Mine and Smelter Supply Co.
Wabi Iron Works.

Antimony:
Canada Metal Co.

Antimonial Lead:
Pennsylvania Smelting Co.

Assayers' and Chemists' Supplies:
Dominion Engineering & Inspection Co
Lymans, Limited
Mine & Smelter Supply Co.
Pennsylvania Smelting Co.
Stanley, W. F. & Co., Ltd.

Ash Conveyors:
Canadian Link-Belt Company

Ashes Handling Machinery:
Canadian Link-Belt Co., Ltd.

Assayers and Chemists:
Milton L. Hersey Co., Ltd.
Campbell & Deyell
Ledoux & Co.
Thos. Heys & Son
C. L. Constant Co.

Asbestos:
Everitt & Co.

Balls:
Hull Iron & Steel Foundries, Ltd
Peacock Brothers Limited.
The Wabi Iron Works.
The Hardinge Conical Mill Co.
The William Kennedy & Sons, Ltd.

Ball Mills:
Hardinge Conical Mill Co.
Hull Iron & Steel Foundries, Ltd
The Wabi Iron Works.
The William Kennedy & Sons, Ltd.

Babbit Metals:
Canada Metal Co.
Hoyt Metal Co.

Ball Mill Feeders:
Hardinge Conical Mill Co.
Hull Iron & Steel Foundries, Ltd

Ball Mill Linings:
Hardinge Conical Mill Co.
The William Kennedy & Sons, Ltd.
Peacock Brothers, Limited
Hull Iron & Steel Foundries, Ltd.

Belting—Leather, Rubber and Cotton:
Canadian Link-Belt Co., Ltd.
The Mine & Smelter Supply Co.
Northern Canada Supply Co.
Jones & Glasco.

Belting:
R. T. Gilman & Co
Gutta Percha & Rubber, Ltd.

Belting—Silent Chain:
Canadian Link-Belt Co., Ltd.
Hans Renold of Canada, Limited, Montreal
Jones & Glassco (Regd.)

Belting (Transmission):
Goodyear Tire & Rubber Co

Belting (Elevator):
Goodyear Tire & Rubber Co

Belting (Conveyor):
Goodyear Tire & Rubber Co.
Gutta Percha & Rubber, Ltd.

Bins and Hoppers:
The Toronto Iron Works, Ltd.
Can. Chicago Bridge & Iron Co., Ltd.
Horton Steel Works, Limited.

Blasting Batteries and Supplies:
Canadian Ingersoll-Rand Co., Ltd
Mussens, Ltd.
Canadian Explosives, Ltd.
Powley & Townsley, Limited.

Bluestone:
The Consolidated Mining & Smelting Co
The Coniagas Reduction Co., Ltd.

Blowers:
Canadian Fairbanks-Morse Co., Ltd
Northern Canada Supply Co.

Boilers:
Canadian Ingersoll-Rand Co., Ltd.
Marsh Engineering Works
R. T. Gilman & Co.
The John Inglis Company
Wabi Iron Works.

Blue Vitriol (Coniagas Red):
Canadian Fairbanks-Morse Co., Ltd

Bortz and Carbons:
Diamond Drill Carbon Co.

Boxes, Cable Junction:
Standard Underground Cable Co. of Canada, Ltd
Northern Electric Co., Ltd.

Brazilian Rough Diamonds:
Diamond Drill Carbon Co.

Brazilian Mica:
Diamond Drill Carbon Co.

Buggies, Mine Car (Steel)
Hendrick Manufacturing Co.

Brazilian Ballas:
Diamond Drill Carbon Co.

Brazilian Rock Crystal:
Diamond Drill Carbon Co.

Brazilian Tourmalines:
Diamond Drill Carbon Co.

Brazilian Aquamarines:
Diamond Drill Carbon Co.

Bridges—Man Trolley and Rope Operated—Material Handling:
Canadian Mead-Morrison Co., Limited

Bronze, Manganese, Perforated and Plain:
Hendrick Manufacturing Co.

Buckets:
Canadian Ingersoll-Rand Co., Ltd.
R. T. Gilman & Co.
Hendrick Manufacturing Co.
Canadian Link-Belt Co., Ltd.
Marsh Engineering Works
Mussens, Ltd.
MacKinnon Steel Co., Ltd.
Northern Canada Supply Co.
The Wabi Iron Works

Buckets, Elevator:
Canadian Link-Belt Co., Ltd.
Hendrick Mfg. Co.
Peacock Brothers Limited.

Cable—Aerial and Underground:
Canada Wire & Cable Co.
Northern Canada Supply Co.
Standard Underground Cable Co. of Canada, Ltd
Peacock Brothers, Limited

Cableways:
Canadian Mead-Morrison Co., Limited
Fraser & Chalmers of Canada, Ltd.
Mussens, Ltd.
The Wabi Iron Works
R. T. Gilman & Co.

Cages:
Canadian Ingersoll-Rand Co., Ltd., Montreal, Que.
Northern Canada Supply Co.
Fraser & Chalmers of Canada, Ltd
The Electric Steel & Metals Co.
The Mine & Smelter Supply Co.
Mussens, Ltd.
The Wabi Iron Works

POWDERED COAL.

A report by J. A. Blizard on the preparation, transportation and combustion of powdered coal, has just been issued by the Department of Mines. Mr. B. F. Haanel says of this:

The Division of Fuels and Fuel Testing, since the organization of the Mines Branch, Department of Mines, in 1907, has been engaged in conducting investigations which have had as their objective the development of the fuel resources of the Dominion.

Owing to the long haul from the coalfields in the extreme east and west of the Dominion, the immense intervening territory—which is highly industrialized, but devoid of any coal deposits of economic value—is practically isolated from our great national assets of coal. This unfortunate isolation has made it imperative (1) that the most efficient methods be employed for converting the coal imported from the United States into heat and power for industrial purposes; and (2) that effective methods be devised to make it possible to utilize the extensive areas of low-grade fuels found in the intermediate provinces—such as peat and lignite—for domestic and other purposes.

With this end in view, investigations involving a large amount of research work have been conducted, from time to time, to show how peat fuel can be utilized for the generation of power through the media of the gas producer and gas engine, and also through the steam boiler and steam engine. Tests on a commercial scale have been carried out with western coals, both bituminous and lignite, for the purpose of determining their special value for steam raising, and the production of a power gas when burned in a gas producer. Research work of a very important character has also been under way for several years, in the carbonization and briquetting of the Saskatchewan lignites. The investigation on which the following report is based, logically follows the practical work already done.

The utilization of powdered fuels for steam raising is not new. A steam boiler designed for burning powdered coal was operated some years ago in eastern Canada; and experiments were conducted at the Baldwin Locomotive Works, Philadelphia, U.S.A., with regard to the burning of powdered coal in locomotives. Moreover, peat powder has, for some time, been successfully burned in place of coal on certain of the Swedish State Railways. During the last few years, however, very important developments have taken place in the methods and apparatus for burning powdered coal—not only for the generation of steam, but also for metallurgical and other purposes. The advancing price of coal, due to increased cost of labour, and, to some extent, to increased difficulty in mining and preparing the coal for the market, has made it possible in certain instances to economically generate power from the lower grades of coal, by burning them in the powdered form; but the economy of any process for burning coal in the powdered form for the generation depends on the cost at which a good grade of coal can be obtained suitable for steam raising, when burned under a boiler in the usual manner. Higher efficiencies, it is true, can be realized with powdered coal systems properly installed and designed; but unless the saving in coal bills due to these higher efficiencies, coupled with the resulting reduction in labour costs, more than offsets the cost of burning the higher grade coals in the ordinary manner for the generation of power, it would not pay to re-design old power plants for burning powdered coal. It is quite possible, however, that the lower grade lignites of western Canada, which rapidly disintegrate when exposed to the weather, may be efficiently burned in the powdered state for the generation of power and other purposes. The Blizard report will show how the lower grade fuels can be advantageously employed for metallurgical and steam raising purposes, when burned in the powdered form.

FACTS ABOUT CANADA.

Few people realize that Canada's water-power development represents an investment of $475,000,000, while the power produced would otherwise require 18,000,000 tons of coal yearly; or that nearly 88 per cent. of the world's supply of asbestos comes from the Province of Quebec. The Natural Resources Intelligence Branch of the Department of the Interior has just issued a revised edition of "Compact Facts," which contains in concise form information regarding Canada, its area, population, trade and industries; their extent, capital invested, wages paid, values of live stock, principal crops and amount produced; mineral resources and present production; also forest resources and forest products. Copies of the booklet are available on application to the Superintendent, Natural Resources Intelligence Branch, Department of the Interior, Ottawa.

EDITORIAL

WILL WE HAVE A REAL MINISTER OF MINES?

During the past several years there has been frequently voiced dissatisfaction with the manner in which matters relating to the mining industry have been dealt with by the Federal Government. Some of the misunderstandings and inefficiency might be avoided by having in the Cabinet a man familiar with the mining business and by giving him the responsibility of working out a mining policy for the Government. Any man who understands the nature of mining operations and their importanee to the country and who has some appreciation of the possibilities of development, could, if given some measure of authority, soon show that a real minister of mines would be an asset to the country.

We have, during recent years, seen numbrous members of the Cabinet designated as "Minister of Mines". All of them were gentlemen who were chosen members of the Cabinet for some more or less good reason; but if any were chosen for their familiarity with the mining industry or with the intention that they should take an active part in the development of the country's mineral resources it has escaped our attention.

A few years ago it was pointed out to the Premier by a deputation of mining men that the industry was not being given fair representation in the Cabinet. It was mentioned that the Ministers of Mines were so out of touch with the industry that they could not possibly be helping the Government to formulate a proper policy with respect to the development of mineral resources. The deputation had a sympathetic hearing; but evidently made no lasting impression, for, in later shuffles in the Cabinet, the portfolio of Minister of Mines was given scant consideration.

Now that a new Cabinet is being formed it is to be hoped that the Mines portfolio will be given to a man who will be expected to devote his attention to mines and mining—a man who can be a real help to the industry and develop a sound and progressive policy for exploitation of mineral resources.

The new Premier does not need to follow all the bad habits of the former Government. If he does so, he will tag the portfolio of Minister of Mines on the holder of some other important portfolio who has been chosen for his willingness to wear the tag, rather than for his ability and intentions to act in a manner befitting a real Minister of Mines.

A Minister of Mines who will devote some attention to matters pertaining to mining would be welcomed by the mining industry, and would be able to count on the advice and help of large numbers of men in the industry. He could be a real factor in the development of the country and could keep the Government in touch with the industry to a degree which has been impossible for many years. A better understanding of the industry and its contribution to the national welfare is much to be desired. This would come from the activity of a man of Cabinet position made responsible for the formulation of a helpful mining policy for the country.

CLASS LEGISLATION.

The Professional Engineers' bill, which was introduced at the last session of the Ontario Legislature, is to be reintroduced, it is understood, at the forthcoming session of that assembly. This bill contains clauses with regard to mining engineering which directly affect the mining industry and its operations. In brief, the idea is that mining engineers should be licensed by an examining body appointed by the Ontario Government and that those who do not present themselves for, or who fail to pass such examination, should not be permitted to perform responsible mining work.

Now, we freely admit that in many States of the United States, legislation of this kind has been popular — largely, we imagine, on the alleged ground that it affords a certain amount of protection to the public. We admit, too, that civil engineers, who, presumably are the parties concerned in promoting such legislation in Ontario, can claim, by way of precedent, that doctors

and lawyers are not allowed to practise medicine or law unless, and until, they have passed examinations and obtained diplomas qualifying them so to practise.

But in some of the States where legislation of this character has been adopted, it has proved practically a dead letter. Moreover, while an examination may be, in the case of medicine or law, the best way of deciding who shall be entitled to practice as doctors or lawyers, that is very far from being the case with regard to mining engineering. The last-named is a calling in which theoretical knowledge is of little value in comparison, with practical ability and experience. The things that a mining engineer has to know are things to be learned, in the main, not from books, but from mines. In essentials and incidentals alike, they have far more in common with railroading than they have with the so-called "learned professions."

Practical experience and natural aptitude—these are the two prime factors which go to the making of the successful mining engineer. And neither examinations nor licenses can give him, or ensure his possession of, either the one or the other. What legislation of the kind contemplated would do, however, would be seriously to handicap the man, however, experienced or however naturally apt, who would not afford or whose parents, could not afford to give him, a certain standard of education.

There are those who will say that such legislation would result in the protection of the public from unjustifiable mining promotion propositions. With this, we do not agree. The best protection the public can have in this respect is that of its own alertness and the active operation of the Company laws of the Province, backed up by the general law, to act as a check on "wild-catters" whose motive is to batten and fatten on the credulity of others.

What we fear about legislation of the kind in contemplation is that the motive behind it may be not so much the protection of the public as the wish to keep a certain class of lucrative work in the hands of a clique. In the state of the mining industry in Ontario, this would do a good deal of harm. It needs the best brains obtainable in its service, irrespective of diploma and so forth. It wants to "get on with the work," and it asks of its engineers that they should possess only the supreme qualification of all—merit.

THE GOVERNMENT AND THE TARIFF.

The Liberal party being now in power we may, if platforms are to be lived up to, soon see changes in the tariff on many items that are used by producers. Among the resolutions adopted at the great National Liberal Convention held in Ottawa in August 1919 was the following resolution on the tariff:

"That the best interests of Canada demand that substantial reductions of the burdens of Customs taxation be made with a view to the accomplishing of two purposes of the highest importance: *First*: diminishing the very high cost of living which presses so severely on the masses of the people; *Second*: reducing the cost of the instruments of production in the industries based on the natural resources of the Dominion, the vigorous development of which is essential to the progress and prosperity of our country.

"That, to these ends, wheat, wheat flour and all products of wheat; the principal articles of food; farm implements and machinery; farm tractors, mining, flour and saw-mill machinery and repair parts thereof; rough and partly dressed lumber; gasoline, illuminating, lubricating and fuel oils; nets, net-twines and fishermen's equipments; cements and fertilizers, should be free from Customs duties, as well as the raw material entering into the same.

"That a revision downwards of the tariff should be made whereby substantial reductions should be effected in the duties on wearing apparel and footwear, and on other articles of general consumption (other than luxuries), as well as on the raw material entering into the manufacture of the same.

"That the British preference be increased to 50 per cent of the general tariff.

"And the Liberal Party hereby pledges itself to implement by legislation the provision of this resolution when returned to power."

If this resolution means anything it means that mining machinery will be placed on the free list.

MORE VIEWS ON SALE OF SHARES.

In our last number we printed some comments by the president of the Standard Mining Exchange on the sale of shares. We have been expecting to hear from other quarters in connection with the proposed "blue sky" legislation, but apparently the organizations of mining men have not yet been asked for their opinions. We note, however, that views are being expressed in some of our newspapers and we reproduce in this number some comments by writers in the "Northern Miner" and the Toronto "Telegram". These writers are evidently in close agreement with one another and their opinions differ markedly in many respects from the opinions of the stock brokers. It is to be hoped that others will give expression to their views. The proposed "blue sky" legislation may result in good or ill according to the interest that is taken in it now.

As the "Northern Miner" aptly expresses it, the encouragement of speculation in mining enterprises rather than in mining stocks is the desired aim of those interested in developing mineral resources. The future of mining in the Province will under any legislation continue to depend more largely on the ability of the men known as promoters than on stock brokers. The promoter's business is to find the money for mining enterprises and his work is quite distinct from that of the broker whose clients are looking for profits from trading in stocks. The mining exchange and the stock broker have a proper place in the financial world, but not in the capacity of promoters. It is the latter who

should shew their interest in the legislation governing the sale of shares; but since they have no organization it is unlikely that we will hear from them collectively. Indirectly the broker is interested since the activity of the promoters results in the creation of enterprises whose shares may later on be traded in, which means more business for the brokers. Trading in stocks is quite a different business from the sale of shares to finance mining enterprises. Mine operators and many others interested in mining have reasons for expressing their views on the sale of shares and it would be well if they would give expression to their thoughts as promptly as the brokers have done, for while the proposed legislation is of special interest to those who undertake to find the money to make mines it has a bearing on the whole industry.

MR. A. J. YOUNG.

The Sudbury "Star" in its issue of Dec. 14 says:

"In the opinion of The Star, it is important that Northern Ontario's interests should be heard, forcibly, in the development of our natural resources, so abundant and rich.

"We believe that an effort should be made to influence the men in control of the situation to select as Minister of Mines a man thoroughly familiar with the Mining industry and a resident of Northern Ontario, because Northern Ontario stands foremost in mineral possibilities among all the mining districts of Canada.

"In this respect the name of Mr. A. J. Young has been frequently mentioned and The Star believes an effort should be made to have Mr. Young made Minister of Mines, and a seat found for him in the North. Under present conditions, and as politics go, this would be in the interests of all. Mr. Young has had a life-long experience in lumbering and mining in the North Country and would speak with knowledge and experience."

Mr. Young is well known in mining circles. He has been for several years actively interested in mining enterprises. He has on many occasions shown an active interest in the industry and is familiar with the problems and has an understanding of the possibilities of developing our mineral resources.

In our opinion he has many qualifications for the office and he would undoubtedly receive the support of many men in the industry. He is also a prominent man in politics and a staunch supporter of the policy of the party now in power. It would be a good thing for the mining industry and for the country if such a man were chosen as Minister of Mines.

ADVANCEMENT OF SCIENCE.

On another page will be found the programs of the engineering and geology sections of the American Association for the Advancement of Science, which meets in Toronto next week. It will be noted that among the papers to be presented are many of interest to the mining world. The Association is serving as a medium for the spreading of useful information and its visit to Toronto should serve to show that science is playing an important part in industry in this part of the country as elsewhere. The program shows that the Association is interested in a wide variety of subjects, and that while some of these seem remote from industry others have an industrial importance that is plainly evident.

EDITORIAL NOTES.

Last week we published an article by Mr. Alexander Gray on the Hollinger. Mr. Gray's estimate of production was based on an estimated recovery of $8.75 per ton. The returns published by the Ontario Bureau of Mines show that the recovery was not so high during the nine months period. The total value of the output is probably somewhat less than Mr. Gray's estimate.

The power situation at Porcupine remains unchanged and unsatisfactory. There is little to encourage those who consider the reopening of the small mines. The large mines could themselves make good use of more power than is now available.

TIMKEN ROLLER BEARING CO.

It will be of interest to readers of this paper to learn that the Timken Roller Bearing Company, of Canton and Columbus, Ohio, in line with its program of expansion, has just broken into a new line—that of mines and mine equipment. This step was definitely taken, so far as the public is concerned, at the annual convention of the American Mining Congress recently held in Chicago, when the company featured an exhibit of its Roller Bearings which attracted much attention and favorable comment. The Timken booth was one of the features. Mine car axles built by two prominent mine car manufacturers and equipped with Timken Bearings stood at the entrance of the booth and played no small part in making it a drawing card.

The salient parts of Timken Bearings that have caused their universal adoption in front wheels as well as other points of hard service in automobiles, trucks, and tractors appeal to mine operators as a solution of the wheel bearing problem in mine car service. Due to the tapered feature, the Timken Bearing carries both radial and thrust loads and all combinations of both, and when, after long and severe service, wear develops, a slight adjustment eliminates it at once. These bearings have exceptional capacity per unit of space required for installation; therefore, more economical than other types. The bearings are easily mounted in the wheels, and ample space is provided for packing with lubricant, so that mine car wheels should not require attention for lubrication or adjustment for a period of from one to two years of hard service.

The Timken Roller Bearing Company has two large modern plants at Canton and Columbus, Ohio, with a capacity of 100,000 bearings a day, and can handle not only the heavy demand from the automotive industry, but the additional business that will come from the industrial field, of which the mining industry is such an important part.

Ontario Silver Mining

General Summary of Ontario Silver Mining Industry Since Discovery of Cobalt.

Production of silver from the mines of Northern Ontario, chiefly from Cobalt, for the calendar year 1921 has reached an aggregate of about 9,900,000 ounces, as near as may be shown by preliminary estimates prepared during the closing month of the year under review.

This production compares with an output of 10,831,146 ounces during the year 1920 and tends to show that the heavy slump caused by the decline in price of silver has probably run its course. A feature of the current year's achievement is that a substantial increase took place in silver production during the last quarter of this year.

Another outstanding feature of the year's development on the silver mines was the discovery of additional rich ore shoots on the Nipissing mine, where silver was found to occur over widths up to as high as 26 inches and assaying 2,500 ounces of silver to the ton.

In the order of their importance, the silver producing mines for 1921 were:—Nipissing, Mining Corporation, Coniagas, O'Brien, Miller Lake-O'Brien, La Rose Consolidated, Keeley Silver Mines, Bailey Silver Mines, Kerr Lake, Aladdin-Cobalt and Hudson Bay. A small amount came from the Haileybury Frontier in South Lorrain and from the Reliance property at Cobalt.

Dividends were paid by three companies, namely, the Nipissing, Kerr Lake and Mining Corporation. In addition to these, the O'Brien, Keeley Silver, Miller Lake-O'Brien and La Rose realized substantial net profits, the first three being closed corporations.

Following is a summary of silver production to date from the mines of Northern Ontario, since the discovery of silver at Cobalt in 1903:—

Year	Average Price cents per ounce	Ounces	Value
1904	57.2	206,875	$ 111,887
1905	60.4	2,451,356	1,360,503
1906	66.8	5,401,766	3,667,551
1907	67.5	10,023,311	6,155,391
1908	52.9	19,437,875	9,133,378
1909	51.5	25,897,825	12,461,576
1910	53.5	30,645,181	15,478,047
1911	53.3	31,507,791	15,253,847
1912	60.8	30,243,859	17,408,935
1913	57.8	29,681,975	16,553,981
1914	54.8	25,162,841	12,765,461
1915	49.69	24,746,534	12,135,816
1916	65.661	19,915,090	12,643,175
1917	81.417	19,401,893	16,121,013
1918	96.772	17,661,694	17,341,790
1919	111.122	11,214,317	12,738,994
1920	100.900	10,831,146	10,687,687
1921 (Est.)	63.00	9,900,000	6,237,900
Totals		324,331,329	$198,956,032

In addition to the silver production as above recorded, the silver mines have produced a large volume of cobalt metal, as a by-product, as well as arsenic.

Dividends from Silver Mines.

The dividend record of the silver producing mines is one without parallel in the history of mining, taking into account the total production and the percentage distributed in the form of dividends.

Nipissing was the heaviest dividend payer during 1921, this company paying 19 p.c.. amounting to $1.-140,000. The Kerr Lake paid dividends regularly from profits derived from operations on foreign property, the total disbursements from this company for the year amounting to $300,000. The Coniagas paid 5 p.c., amounting to $200,000, thereby making a total of $1,640,000 in dividends during 1921 from the silver mines, not including the profit made and distributed by closed corporations.

Silver Mine Dividends.

Name of Company.	1921 Dividends.	Total Dividends to Date
Aladdin-Cobalt	.....	$ 75,000
Beaver Consolidated	.....	710,000
Buffalo	.....	3,637,000
Caribou (Drummond)	.....	225,000
Casey-Cobalt	.....	203,249
Cobalt Central	.....	192,845
Cobalt Comet	.....	230,000
Cobalt Silver Queen	.....	315,000
Coniagas	$200,000	10,240,000
Crown Reserve	.....	6,190,849
Foster-Cobalt	.....	45,774
Hudson Bay	.....	778,909
Kerr Lake	300,000	9,160,000
La Rose	.....	7,505,409
McKinley-Darragh	.....	5,955,391
Mining Corporation	.....	5,499,867
City of Cobalt	.....	145,000
Cobalt Lake	.....	465,000
Cobalt Townsite	.....	1,042,259
Nipissing	1,140,000	24,223,297
Penn Canadian	.....	256,443
Peterson Lake	.....	462,350
Right of Way Mining Co.	.....	324,643
Right of Way Mines	.....	252,825
Seneca Superior	.....	1,579,817
Temiskaming	.....	2,159,817
T. and H. B.	.....	1,940,250
Trethewey-Cobalt	.....	1,211,998
Wettlaufer	.....	637,465
Closed Corporations	.....	7,000,000
Total	$1,640,000	$93,256,562

Grand Summary of Output and Dividends from Silver and Gold Mines of Northern Ontario.

Industry.	1921 Dividends.	Total Dividends to end of 1921
Silver Mines	$1,640,000	$93,256,562
Gold Mines	4,269,709	22,241,906
Totals	5,909,709	$115,498,469

Industry	1921 Output	Total Output to end of 1921
Silver Mines	$6,237,000	$198,956,032
Gold Mines	14,011,504	74,075,255
Totals	$20,248,504	$273,031,287

Orderly Readjustment in Asbestos Industry

By ALEXANDER GRAY.

The best judgment in the Asbestos Industry decided it could not force markets. It was taken for granted that demand for the various grades inevitably is governed by restricted consumption. While fundamental conditions are sound, therefore, producers in general faced the facts—rather than break prices they shut down or reduced the output, recognizing that it may take a year or so to right matters. South African companies have had the same experience as their Canadian and American contemporaries. The latest advices are that they have ceased operations or are doing little or nothing. Quebec producers are somewhat more fortunate in that their fibers have quality and variety to commend them—what the world will take they can supply. Admittedly, with few exceptions, marketing organizations have failed to move acumulating stocks. As one well-informed official naively expresses it: "The trouble lies in the purchasing power of consumers, rather than in over-production. We must be content to await broad industrial revival and relaxation of credits," a familiar admission that is not confined to the Asbestos Industry. It is understood those that thought to flout inexorable trade conditions found difficulty in distribution, reduced prices not being more than an incidental inducement. Even where lower quotatons were preferred for larger and longer contracts, the retort courteous has been: "We thank you, and will be pleased to return to the subject when the opportunity arises." Consequently warehouses in several instances are overstocked with short fibers—and banks are not averse to more action.

Superintendent Denis of the Quebec Department of Mines estimates the 1921 production of asbestos has been about 40 per cent of what it was in 1920. In other words he thinks it has amounted to 75,000 tons valued at about $5,250,000, allowing for lower prices obtained. The net effect is to make the value of the 1921 production about 35 per cent of what it was in 1920.

From another source it is intimated that the 1921 output was about 50 per cent of that of 1920, with the value reflecting a lower range of prices. Either estimate acknowledges the situation. Mr. Denis specially notes the continuance of the demand for the medium grades and a slackening market for crudes. Notwithstanding this it is understood one or two companies do not complain of the volume of business in No. 1 crude at $1,500. At the same time Mr. Denis states:

"At present most of the sheds are full, and operations have been curtailed to a minimum. Several properties are not producing, but nevertheless, so as to keep the staffs and the workmen from disbanding and emigrating, as they can do, the pay-rolls are still heavy. Moreover all the companies are doing what they can to alleviate the unemployment situation."

As usual, in such circumstances, there has been more or less pressure upon the markets, and undertandings as between producers have not been strictly adhered to. The stronger factors have earned all their dividends—the weaker find bankers importunate and buyers inadequate. For a while, the Rhodesian and Cape Colony production was a cause of apprehension, but this was eliminated and it is clearly understood that a short period of revival would restore the essential equilibrium between the world's production of 220,000 tons and the world's consumption of between 215,000 and 220,000 tons. Cape blue never has approached in price Quebec's crude. The former with 35 per cent of oxide of iron; the latter with 2 per cent, establishes the superiority of the Quebec product. That is why those who have thoroughly standardized crude have held their fairly satisfactory markets at $1,500 and foresee a trade improvement that will enable them to dispose of their surplus stocks of various grades. They do not expect No. 1 crude to bring War prices. On the other hand, Quebec first quality fibres outrival all others. Survival of the fittest applies to Asbestos—and to Asbestos producing companies, the weaker elements in which will become more of an object lesson than a source of unsettlement. Acquisition of asbestos properties became a vogue. Not a few of them are a vacuum—or will be; for the processes of deflation and results of overestimation more than once have brought discomfort to hastily improvised asbestos promotions. Fully realizing this, the largest producers have no misgivings, however much they deprecate malafides on the part of those who probably cannot be passive.

Obviously the Asbestos Industry met with a temporary reverse. Attempts to hold prices have been more or less successful. Labor has been reactionary, and sought to compel some of the companies to maintain production regardless of markets. These difficulties solved themselves—the mills that are operating are the exceptions. Constructively much has been accomplished. Explorations have extended the areas of the Asbestos Corporation and other companies, and new deposits have been undergoing development in Coleraine, Wolfestown, Cleveland, and other Townships. Responding to the popular desire for the fabricating of asbestos materials in Canada, the Canadian Johns-Manville people prepared for a large factory, to be erected near their mine, at Asbestos. Owing to the general depression, the enterprise has been deferred.

The sympathetic Quebec Government may make affirmative reply to petitions for a modification of the royalty rate. This rate is being levied on the invoiced value of shipments; so the consumer has to pay it. Formerly the rate was 3½ per cent. Now it is 5 per cent. Owing to trade developments and competition, Quebec producers hope to have this tax abandoned or modified. An Asbestos Mine Operators' Association has the matter in hand. The Government have been impressed with the world wide complications. For 1920 the Asbestos Industry contributed about $750,000 from this rate. Meanwhile Rhodesia, the Transvaal, Cape Colony, Arizona and California, have bestirred themselves. In the immediate future competition is not likely to be bothersome, notwithstanding the identification of wealthy men with several Rhodesian ventures, as yet far removed from large markets. Moreover, Quebec extraction of 109.1 lb. of fibre per ton of rock mined, valued at $4.53 per ton, conveys its own meaning, qualities considered.

Despite the prestige of Quebec Asbestos, and the commendation of the trade, it is becoming more apparent that a greater degree of co-operation within and without the Quebec Industry is imperative. Internal economies are enforced, and may become more effective.

Asbestos-bearing areas are all-sufficient; so production is assured. Yet it is conceded, as Superintendent Denis emphasized, that the territory south of the Zambesi possesses "four varieties of asbestiform minerals in commercial quantities": chrysotile, crocidolite, amosite and tremolite. Mr. Denis explains, upon the authority of Mr. A. L. Hall, assistant director of the Union of South Africa Geological Survey, that the crocidolite is what is known as "Cape Asbestos and Blue Asbestos," a composition of silicate of iron and sodium. "It is quite perceptibly heavier than chrysotile, having a specific gravity of 3¼, while chrysotile is 2½. The rocks in which are found the deposits of this pecular mineral have an extensive distribution. They occupy a wide belt, starting at Cape Colony, thirty miles south of Prieska, on the Orange river, and extending in a northern direction for a distance of 240 miles, beyond Kuruman. The belt varies in width between five and twenty miles." The geographical disadvantage and transportation problems are recognized, but production has increased and there are admonitory elements in the amosite, in that it is "more closely related to crocidolite; is distinguished from crocidolite by the absence of sodium; is a silicate of iron, with or without silicate of magnesium, and is charaeterized by the extreme length of the fibres, 5 to 8 inches being frequent, the greatest observed length being eleven inches."

Sooner or later that new variety—a ferrous amphibole—may have possibilities. It exists in the northeastern part of the Transvaal and is alleged to have merit as a spinning fibre. It has been located in a section sixty miles long and three miles wide along the Oliphants river, and while it was discovered in 1907 it was not a commercial quantity until 1916. South Africa is awake to the importance of its deposits of Asbestos and has erected plants at Cape Town, Durban and Johannesburg. Production of amosite increased from 55¼ tons in 1915 to about 4,000 tons in 1920.

Given the industrial revival awaited, the Quebec Industry will continue to provide over eighty per cent of the Asbestos. The stability of prices rests with the stronger producers. Price-cutting and haphazard marketing it is not believed will induce buyers to stock up while trade conditions are uncertain. There is all the more reason for concerted action, because South Africa cannot be ignored. Fourteen years ago chrysotile was reported from the Shabani-Belingwe area in Rhodesia. At that time markets were discouraging and transport almost prohibitive. Immediately prior to the war another find was made in the Victoria district, in the Umvukwe Hills, in the Lemagundi area. It is in the Mashaba Hills that the King Mine is located. The Shabani section has been a center of activity. What is represented to be the largest and richest chrome and asbestos property in the world is being developed at Umvukwe by Latilla-Hamilton interests, also identified with Ontario's gold and silver country. Speaking of this deposit last September, Mr. H. G. Latilla in London said:

It could be quickly brought to a point at which a large production could be made, but under existing industrial conditions, when the steel industry is more depressed than it has been for a generation, it would manifestly be unwise to incur such an expenditure. In the meantime, a great deposit has been demonstrated, and sooner or later the demand for chrome will assuredly reassert itself.

The asbestos section has made very satisfactory progress. During this year very considerable sections of the ground which were thought to be unpayable have been opened up with favorable results, and prospecting operations have proved the existence of the deposit for a mile to the eastward of the older workings, and as work goes on the deposits appear to be increasing in width and value. Asbestos is being regularly shipped, and, judging from the valuation made in London and the sales already effected, the value of the fibre we are producing would appear on to-day's low basis of prices to average about £100 a ton.

It is owing to the reaction and indisposition to belittle competition that the solicitude of the Quebec Government is sought—and no doubt it will be granted.

AMERICAN ASSOCIATION FOR THE ADVANCEMENT OF SCIENCE.

Programs of engineering and geology sections.

Section M.—(including the Society for The Promotion of Engineering Education).

Programme for Sessions, Dec. 27 to Dec. 30, 1921.

Sessions will be held in Room 21, **Electrical Building.**

TUESDAY, DECEMBER 27.

10 a.m.

1. Address of Retiring Vice-President, Dr. Carl Leo Mees, Director of the Research Laboratory, Eastman Kodak Co., Rochester, N.Y.

2. "Natural Resources and National Welfare," by The Honourable Sir Clifford Sifton, K.C.M.G., etc., formerly Minister of the Interior, and Head of the Conservation Commission of the Dominion of Canada.

3. "The Super-Power Project," Mr. W. S. Murray, Consulting Engineer, New York.

2 p.m.

1. "Optical Determination of Stress Distribution in Engineering Problems," Mr. Paul Heymans.

2. Return Current along sea cables," by Charles Mannebeek.

WEDNESDAY, DECEMBER 28.

10 a.m.

1. "Ice Formation and Prevention with Special Reference to Frazil and Anchor Ice," (Illustrated by moving pictures), Mr. John Murphy, Electrical Engineer, Department of Railways and Canals, Ottawa, Canada.

2. "Engineering Standardization," Mr. R. J. Durley, Secretary, Canadian Engineering Standards Association, Ottawa, Canada.

3. "Fifty Years of Progress in Mining in Canada," Mr. John E. Hardman, Consulting Mining Engineer, Montreal, Canada.

2 p.m.

1. "Recent Progress in Metal Mining in Ontario," (Illustrated by Moving Pictures), Mr. Thos. W. Gibson, Deputy Minister of Mines, Ontario.

2. "Gold Mining in Ontario," (Illustrated by Moving Pictures), Mr. A. F. Brigham, General Manager, The Hollinger Mine, Ontario.

3. "Nickel Mining and Smelting" (Illustrated by Moving Pictures), Mr. W. L. Dethloff, Chief Engineer, The Mond Nickel Company, Ontario.

THURSDAY, DECEMBER 29.

10 a.m.

1. "Toronto Harbor Development," Mr. E. L. Cousins, Chief Engineer and Manager, Toronto Harbour Commission.

2. "Industrial Research," Mr. R. A. Ross, Chairman,

Honorary Advisory Council for Scientific and Industrial Research, Canada.

3. "Railway Development in Canada," Mr. H. K. Wicksteed, formerly Chief Locating Engineer, Canadian Northern Railway.

2 p.m.

1. "Exploration for Oil in Western Canada," Mr. A. M. McQueen, Vice-President, Imperial Oil Company, Toronto.

2. "Coal Mining in Alberta," Mr. James McEvoy, Consulting Coal Mining Engineer, Toronto.

3. "Oil Resources of the Valley of the Mackenzie River," Mr. D. B. Dowling, Geological Survey of Canada.

4 p.m.

In Convocation Hall.

"Hydro-Electric Development in Ontario," (Illustrated by Moving Pictures), Sir Adam Beek, Chairman, Hydro-Electric Power Commission of Ontario.

FRIDAY, DECEMBER 30.

S. P. E. E.

10 a.m.

"Relation of Industry and the Practicing Engineer to Engineering Education"—Addresses by R. C. Harris, Commissioner of Works, Toronto, Prof. Chas. F. Scott, Yale University, President of the Society for the Promotion of Engineering Education, and others. A discussion of the type of engineering graduate now demanded, the character and training he should receive and the character and training of instructors needed in engineering colleges.

2 p.m.

"Engineering Education Versus Vocational Training"—Addresses by Dr. F. W. Merchant, Director of Industrial and Technical Education, Province of Ontario, Prof. Dugald C. Jackson, Massachusetts Institute of Technology, and others. Delimitation of respective fields of these types of training to be discussed.

7.15 p.m.

Dinner. Place to be announced.

AMERICAN ASSOCIATION FOR THE ADVANCEMENT OF SCIENCE TORONTO MEETING

DEC. 27-30, 1921.

Section E.—Geology and Geography.

Vice-President and Chairman, Willet G. Miller, Toronto, Canada.

Retiring Vice-President Eliot Blackwelder, Cambridge, Mass.

Secretary—Elwood S. Moore, State College, Pa.

Programme of Section E. Dec. 27-30, 1921.

Tuesday Morning Session—Dec. 27, 10 a.m. Room 64, Mining Building, University of Toronto.

Dr. Eliot Blackwelder presiding.

(1) **The A.A.A.S. and Canadian Geology; a Retrospect,** W. G. Miller Provincial Geologist, Toronto Ont.

(2) **Some Physiographic Forms of Western North Dakota** (Lantern 20 minutes), Harry N. Eaton, Syracuse University, New York.

(3) **Mineralography or the Microscopy of the Ore Minerals,** (Lantern 20 minutes) Ellis Thomson, University of Toronto.

(4) **A New Genus, and Species of Dinosaur from the Belly River Beds of Alberta** (15 minutes) W. A. Parks, University of Toronto.

(5) **The Pre-Cambrian of Western Patricia** (15 minutes), E. M. Burwash, University of Manitoba.

Tuesday Afternoon Session, Dec. 27, 2 p.m., Room 64, Mining Building, University of Toronto.

Dr. Eliot Blackwelder presiding.

Session on Glaciation.

(6) **The Glacial Period, its Record in Iowa** (Lantern 45 minutes) George F. Kay, State Geologist of Iowa.

(7) **Some Recent and Pleistocene Glaciers of Argentina and Bolivia** (20 minutes) A. P. Coleman, University of Toronto.

(8) **The Drumlins: The Cause of their Formation** (15 minutes) Colonel John Millis, Chicago, Ill.

(9) **The Stratigraphy and Palaeontology at Toronto** (25 minutes) W. A. Parks, University of Toronto.

(10) **Outline of the Physiographic History of Northeastern Ontario** (Lantern, 20 minutes), W. H. Collins, Director Geological Survey, Canada.

Wednesday Morning Session, Dec. 28, 9.30 A.M., Room 64, Mining Building, University of Toronto.

Address of the Retiring Vice-President, Dr. Eliot Blackwelder, on "The Trend of Earth History."

Session on Sedimentation.

(11) **Sedimentation in Lake Louise, Alberta, Canada,** (presented by permission of the Director of the Geological Survey, Canada). (15 minutes), W. A. Johnston, Geological Survey, Ottawa.

(12) **Sedimentation in MacKay Lake, Ottawa, Canada** (15 minutes). E. J. Whittaker, Geological Survey, Ottawa.

(13) **A Natural Classification of Sedimentary Rocks** (20 minutes). Richard M. Field, Brown University, Providence, R.I.

(14) **The Present Status of the Medina Problem in Southeastern Pennsylvannia** (Lantern, 20 minutes). Harry N. Eaton, Syracuse University, N.Y.

Wednesday Afternoon Session, Dec. 28, 2 P.M., Room 64, Mining Building, University of Toronto.

Dr. W. G. Miller, presiding.

(15) **Some of the Physico-Chemical Properties of Colloidal Solutions and their Relation to Geological Processes** (20 minutes) E. F. Burton, University of Toronto.

(16) **The Mackenzie River Basin** (Lantern—20 minutes). D. B. Dowling, Geological Survey, Ottawa, Canada.

(17) **The Fluorspar Deposits of the Madoc District, Ontario** (15 minutes). M. E. Wilson, Geological Survey, Ottawa, Canada.

The Section is cordially invited to visit the Royal Ontario Museum and inspect the collection. At 3 p.m. the session will adjourn to the Museum.

Thursday Morning Session, Dec. 29, 9.30 A.M., Room 64, Mining Building, University of Toronto.

Dr. W. G. Miller, presiding.

(18) **The Geology and Surface Features of the Torngat Mountains in Northern Labrador** (Lantern 20 minutes), A. P. Coleman, University of Toronto.

(19) **The Influence of Rock Structures on Quarrying Methods** (15 minutes), Oliver Bowles, Bureau of Mines, Washington, D.C.

(20) **Gaspé Peninsula; The Country, Its Geology and Economic Possibilities** (20 minutes), E. J. Alcock, Geological Survey, Ottawa, Canada.

(21) **The Geology of Oil in Canada** (Lantern, 30 minutes). D. B. Dowling, Geological Survey, Ottawa, Canada.

Dust Reduction by Wet Stopers

By D. HARRINGTON.
(Supervising mining engineer, U. S. Bureau of Mines.)

In the study of miner's consumption it has been found that dry drilling, especially in unventilated places, is by far the most dangerous underground occupation. Detailed study indicates that in general the drilling of upper holes creates the worst condition as to dustiness of air breathed by drillers. The introduction of machines with water injection through the drill for cross cutting and driving readily controls the dust menace for practically horizontal holes or those with a downward inclination. Where the hammer type of dry drill is used for the same work, the dustiness of the surrounding air is likely to be as great as or even greater than in dry drilling of upper holes with the stoper types.

The following table gives some data as to air dustiness with various kinds of drilling in two mining regions, "A" and "B" of the western part of the United States, air sampling being done by the sugar tube method.

It will be noted that for 17 samples taken in mines of region "A" dry drilling approximately horizontal holes with the hammer type of machine (with average dust content in air breathed by driller, 345.1 milligrams per cubic meter of air) gives the most dusty condition; dry drilling of upper holes by stopers coming next in dustiness with average of 208.3 milligrams of dust per cubic meter of air for 23 samples; drilling of approximately horizontal holes with water injection type giving an average of but 9.3 milligrams per cubic meter of air for 24 samples taken. As shown by the table, the average dustiness when shoveling in these mines is 17.7 milligrams per cubic meter of air as determined by 24 samples. It may be of interest to note that the South African maximum allowable dustiness of mine air even at working places is 5 milligrams per cubic meter of air, and a letter from South Africa states that recently an extended series of samples of air breathed by drillers using various types of drills and working under various conditions in South African mines uniformly gave less than 5 milligrams of dust per cubic meter of air.

It will be noted from the table that in the mines of Region "A" the use of external sprays in 3 samples with dry drilling of nearly horizontal holes by hammer drills there was considerable reduction in the air dustiness compared with when the sprays were not used (average 263.2 with spray against 345.1 without spray), yet even with the spray the air dustiness was much greater than the excessively dusty condition of air when drilling upper holes with dry stopers (263.2 milligrams for dry hammer drills with spray against 208.3 for upper holes with dry stopers.) Hence the use of the external spray can not be considered a success even though the average dust content of the surrounding air was reduced over 25 per cent as compared to conditions without its use. The inefficiency of this external spray is also brought out in a few tests with dry stopers in Region "B" (see table) where 3 samples of air when dry drilling upper holes with stopers gave an average of 305 milligrams per cubic meter (minimum being 282.2 and maximum 327.8). When the external sprays were used with these dry stopers the average was 458.9 milligrams per cubic meter of air (minimum being 193.8, maximum 735.3). Here the average dust content of air breathed by the driller was actually greater with the spray than without it, as one driller directed the spray in such manner that mist, laden with minute mineral particles was thrown back onto his face.

In all of the above cases the men using the spray did not manipulate it properly to protect them from the dust, yet it was evident that even had they been expert and utilized the spray with maximum efficiency there would still have been dangerous quantities of dust in the air. On the other hand, it was shown by 16 samples that the use of *water stopers* on upper holes (see also above table) by men unfamiliar with their use, reduced air dustiness in drilling of upper holes from an average of 208.3 milligrams per cubic meter of air with dry stopers to 28.8 milligrams with wet stopers. These wet stopers were out of order and working very poorly. It is probable that had the wet stopers been in good repair and in the hands of experienced men, the air dustiness would have averaged less than 10 milligrams per cubic meter of air, or approximately the average for water-injection piston drills. Even with maximum precaution in drilling, the South African standards of freedom from dust can not be reached without adopting their stringent regulations as to the sprinkling of surrounding areas in addition to dust prevention in drilling.

It is my opinion that the use of external sprays in connection with dry drills is an inefficient method of dust prevention. It is evident that use of water through hollow steel has been effective in dust prevention where piston types of machines have been used in driving, and even in stoping and in raising where conditions were such that they could be used. Inasmuch as stoping and raising is usually done with stopers, and as stopes and raises are ordinarily poorly ventilated, one of the main

Dustiness of Air of Underground Workings Breathed by Drillers Using Various Types of Drilling Machines. Two Mining Regions in the Western Part of the United States.

Type of machine	Region	No. of Samples	Method used	Kind of holes	Dust content of air in milligrams per cubic meter Minimum	Maximum	Average
Hammer type	A	17	Drilling dry	Approx. horiz. and some down holes	29.2	765.1	345.1
Hammer type	A	3	Drilling dry but using external spray	do.	78.5	412.9	263.2
Stoper type	A	23	Drilling dry	Inclined 60 deg. to vertical	26.8	675.5	208.3
Stoper type	A	16	Drilling wet-water through steel	do.	5.9	93.9	28.8
Water injection type	A	24	Water through steel	Slightly inclined at horizontal	3.7	49.4	9.3
No drilling-men mucking	A	25	.....	.....	5.2	123.6	17.7
Stoper type	B	3	Drilling dry	Practically vertical	282.2	327.8	305.0
Stoper type	B	3	Drilling dry but using external spray	do.	193.8	735.3	458.9

Note: South African standard of air dustiness is 5 milligrams per cubic meter of air.

dust prevention problems in metal mines has been that of providing a water injection with a stope drill. At the present time at least three (perhaps more) practical stopers have been perfected, which force water through the steel and "kill" the dust as it is formed at the drill bit.

In the development of wet stopers it has been found that the use of water not only practically eliminates the dust but also has numerous other advantages, together with a few disadvantages.

While there are numerous distinctive features of the different makes of present-day water stopers, there are two main types — the self-rotating and the hand rotated, both having hollow steel through which water is forced to the bit. In general, the self-rotating wet stopers weigh about 110 pounds while those hand rotated weigh about 95 pounds, the ordinary hand-rotated dry stoper weighing 80 pounds or less. Some dry stopers are readily convertible into hand rotated wet stopers at a cost of $50 to $75 per stoper and this type is giving good satisfaction in at least one large mine. The first cost of the self-rotating wet stoper is 50 to 75 per cent. greater per machine than that of the dry machines paralleling the situation as to the higher cost of upkeep of water injection piston machines as compared with the old piston type. In general, the breakage of drill steel is less with the wet than with the dry stoper and greater footage can be obtained per sharpening with the wet than with the dry type.

For some years a large copper mining company has been experimenting with water stopers and now has more than 200 self-rotating water stopers. Two of its mines for a period of about a year prior to the shut-down in April, 1921, had wholly discontinued the use of dry stoper and the cost of upkeep of the wet stoper is much greater per machine that that of the dry stopers. At present its only operating mine is using wet stopers only. Three makes of self-rotating wet stopers have been tried and all pronounced commercially successful. All are applicable to drilling of any kind of ground encountered in the district, hard to soft, solid to broken. This flexibility is due largely to the brake with which the machines are equipped. The self-rotating wet stopers drill nearly double (frequently more than double) the number of inches per minute drilled by dry stopers. Moreover, they prevent dust formation in the drillhole and the water used wets the surroundings sufficiently to lay at least partly the dust in broken ore, on timbers, in chutes, etc., and also materially decreases the temperature of hot places. While the first cost of the machines is nearly double that of dry drills and the cost of upkeep more than double that of dry drills, yet the company referred to, after a thorough tryout extending over two years has determined to adopt wet stopers as standard equipment in its mines.

The most difficult feature connected with the introduction of the wet stoper is the opposition of the miners who are prone to say that they prefer to "swallow" the dust, taking chances as to subsequent miner's consumption, rather than become, as they say, crippled with rheumatism from the water, especially from upper holes. Where one or two wet stopers are given to miners to be tried out in a mine where dry stopers are used, the miners will almost invariably condemn the new machines from almost every possible viewpoint; and even when the dry stopers are wholly eliminated and wet stopers substituted, the men try to drill dry with the wet stopers, generally with rather poor results. However, after compelling the proper use of wet stopers by strict disciplinary measures, the very men who were bitterest in opposition soon become the greatest advocates of the new machines. The best demonstration of this is the fact that contract miners accustomed to the new machines demand them for use in raises and in stopes.

The wetting of the driller is largely a matter within his own control, except of course where there is neglect in assembling parts or when some accident occurs, such as breaking of drill steel, hose, or other part of the equipment. There is, of course, much more probability of getting wet with the water stoper than with the dry stoper, just as with the water-injection piston machine, yet men now complain very little about wetting caused by the latter. Some mining men say that due to getting wet with water the use of wet stopers, especially for upper holes, will be restricted to places with air temperature above 70 deg. F. however, a large mine with air temperatures at working places as low as 50 deg. F., is using *hand-rotated* water stopers for raising and the superintendent reports that the men refuse to work when asked to drill dry. The only dry drilling in the mine is done when talc plugs the hole in the end of the drill steel, the practice then being to drive a short piece of wood into the bit and continue drilling until the steel is dull or has drilled its limit. The wooden plug is readily burned out while sharpening the bit, and prevents the talc from entirely filling the hole throughout the steel with probable destruction of its further usefulness.

Notwithstanding the disadvantages mentioned, such as greater weight, higher first cost and upkeep, and probability of the driller's getting wet, there is no doubt that water stopers are to be preferred to dry stopers when the above disadvantages are weighed against dust elimination, greater flexibility as to drilling various kinds of ground, greater speed of drilling, and lessened breakage and amount of sharpening of drill steel, together with the cooling effect of water in hot places and the protection against fire offered by the presence of water lines in all places. The health feature alone should cause the elimination of dry drilling and when to this is added greater speed and probably lower total cost of drilling per ton, progressive mine operators should see that wet stopers are given a thorough and a fair trial. — Reports of Investigations, U. S. Bureau of Mines.

U. S. SOFT COAL PRODUCTION.

Although soft-coal production is normally at a maximum at this season, it has in fact dropped back to the level of last April, normally the lowest month of the year. For two weeks in succession production has hung around 1,200,000 tons per day, whereas the smallest daily output in any December of the preceding eight years was 1,379,000 tons. The total output during the week of December 10, including lignite and coal coked, is estimated at 7,235,000 net tons, asagainst 7,104,000 tons in the week preceding. A year ago production was 12,813,000 tons. In connection with this subnormal production two facts should be remembered. The first is that the movement of coal up the Lakes has now virtually ceased. The second is that during October, with a railroad strike in prospect, consumers hastened to increase their stocks, and some millions of tons flowed into storage. At present the flow is out of storage, for 7,200,000 tons a week is not sufficient to meet current consumption and exports. Clearly, if it were continued for long, the draft on stocks might carry reserves below the danger point.

Northern Ontario Letter

THE SILVER MINES

Silver Cliff Reopened

Announcement is officially made to the Journal that the Silver Cliff mine will be reopened this week and that the shipment of ore to the Baily Customs mill will commence at an early date. There is approximately 3000 tons of medium grade ore in sight, and the possibilities are good that the present known ore bodies may be found to extend far beyond their present known limits. No statement has been issued in regard to those behind the movement, but it is rumored that the Bailey Silver Mines will operate the property under lease.

Cobalters Visit Soo District

An expedition made up of Jas. Rattray, H. W. Hartley and J. McLeod, headed by Hugh Park, manager of the Nipissing Mining Company, left Cobalt this week for Sault Ste. Marie. The object of the trip has not been officially announced, but has to do with the examination of mining property in that district, possibly at Goudreau.

Right-of-Way Mine Sold

The Right-of-Way Mines, which went into the hands of a receiver not long ago, has been purchased by E. J. Daly, of Montreal, according to authentic information just secured by the Journal.

Hudson Considers Cane

A meeting of the Hudson Bay Mines will be held within the next few days to consider the question of taking over the operation of the Cane Silver Mines, situated in the township of Cane in the Elk Lake district. A representative of the Hudson Bay visited the property some weeks ago and made a general examination. Surface showings are quite spectacular, and about $1,200 was realized from ore shipped by the former operators during the course of sinking a shaft to a depth of 42 feet.

Silver in Gillies Limit

Silver has been encountered in encouraging quantities on the property known as the Cobalt-53, situated in the Gillies Limit at Cobalt.

Nipissing's New High-Grade Ore Shoot

During November the Nipissing mine continued to produce silver at a heavy rate, the output for the period amounting to an average of $8,375 every twenty-four hours. In his regular monthly report to the president and directors, Hugh Park, manager, says:

"During the month of November the company mined ore of an estimated net value of $251,253 and shipped bullion from Nipissing and customs ores of an estimated net value of $71,807. The value of the month's silver production was estimated at 66¼ cents per ounce.

"A few small veins were discovered in November, but in the absence of development work they do not appear to be of importance. Preparations for active sinking on vein 251 at 63 shaft have almost been completed. The winze is now down 5 feet and shows three inches of ore assaying 5000 ounces. The 70-foot ore shoot developed at the second level on this vein assayed 2500 ounces over an average width of three inches. The depth of the underlying keewatin at this point is unknown, but it is expected at about 90 feet.

Development work, by raises, at the third and fourth levels of 64 vein continued throughout the month, generally with good results. No further work was done on the high grade ore found in October, as the area will be stoped eventually.

"The low grade mill treated 6,343 tons. The high grade plant treated 197 tons. The refinery shipped 100,602 fine ounces of bullion."

Silver production	$237,183
Cobalt	14,070
Total	$251,253

Dividends

Dividends measured in scores of millions from the silver and gold mines of Northern Ontario is already an accomplished fact, while dividends measured in hundreds of millions are actually in sight.

Figures show an aggregate of 115 million dollars already paid out in dividends from these mines, while the various company treasuries contain many additional millions, and with probabilites of an aggregate output of over a billion dollars in precious metal pointing the way to hundreds of millions in dividends.

The precious metal mines of Northern Ontario have already made a number of millionaires and a great many men have been made moderately rich. Mining history already contains the names of such prospectors as Harry Oakes, Benny Hollinger, William Wright, Jack Miller and so on who made fortunes out of mining claims. The names of men who have made big fortunes out of the operation of mines are numerous and generally quite well known.

The question is this: Who among those now engaged in the business of prospecting and mining in Northern Ontario are to share in a big way the multiplied millions which are assured from these mining fields in the years to come?

Bailey Silver

Production and development at the Bailey Silver Mines during November were very satisfactory. The report shows that gross earnings of the Bailey Customs Mill for the month reached approximately $12,877, the mill having treated a total of 4,292 tons of ore. Of this total tonnage 1,183 tons came from the Bailey Mine itself.

Several small stringers were encountered during the course of development work in a cross-cut at the 4th sub-level. Development work has been started on a winze at the 4th level west where good silver values are in evidence. This work will be carried on and drifting will commence at the contact to follow the known veins.

"Negotiations with the La Rose Mines," says the official statement, "for the treatment of their ores at the Bailey Mill have been concluded and assures the Bailey Company of the La Rose ores for treatment in the custom mill for several years to come."

Shipments from Cobalt

During the month of November, according to official figures submitted by Arthur A. Cole, mining engineer for the T. and N. O. Railway, the mines of the Cobalt district shipped an aggregate of 213½ tons of ore over the railway.

tons. The Mining Corporation of Canada sent out

The heaviest shipper was the Coniagas with 64½ tons, while the O'Brien was a close second with 64 53 tons, while the Hudson Bay shipped 342 tons. Of the total 64 tons were consigned to Canadian and 149½ tons to United States smelters.

During the period, the price of silver reached a

maximum of 70.250 cents per ounce on Nov. 2nd and a low point of 66.250 cents on Nov. 26th, while the average for the month was 68.234 cents per ounce.

THE GOLD MINES

Dome Mines

During the third quarter of 1921, according to official figures in the hands of the Journal representative, the Dome Mines realized an income of approximatly $700,000. The mill recovered an average of $7.12 per ton, the heads having averaged approximately $7.50. The mill treated an average of 983 tons every twenty-four hours and produced $644,052, added to which was the premium on gold, which brought the total up to approximately $700,000. This achievement is believed to indicate that the Dome will experence no difficulty in establishing a uniform production of approximately $3,000,000 annually, beginning with the opening of the next month.

Schumacher

"The tale of the tape" in the brokerage office tells a story about the Schumacher Mines. The Journal's correspondent last week reported a deal under way for control of the property, and the quotations for the shares have recently been soaring. No official announcement has been made as to what interests are behind the movement to close a deal, although the "street" carries rumors of it being either the Hollinger or the McIntyre, while still another rumor has it that the Nipissing Mining Company of Cobalt is bidding for control.

Nipissing Drilling Rochester

Drilling of a seventh hole on the Rochester property has been commenced by the Nipissing Mining Company, and there is a general belief that the big silver mining concern will become established in Porcupine through acquiring the Rochester. The working option holds good until next spring, however, and the outcome of the exploration work may not be announced before that time.

Hollinger

The Hollinger Consolidated will disburse a 1 p.c. dividend on Dec. 31st, thus rounding out a total of 13 p.c. during 1921, or an aggregate of $3,126,000. The company has recently established a new high tonnage record, and is stated to have accumulated a large surplus during the year in addition to paying the present high rate of dividends. Production for the year 1921 will be close to $9,000,000 in spite of the adverse conditions during the first four months of the year due to shortage of hydro-electric power.

Road to Lightning River

Residents at Ramore station on the T. and N. O. Railway have exhibited genuine public spirit and have joined with claim owners in clearing a winter road from Ramore to the Lightning River gold area. This will shorten the haul by about 15 miles as compared with the road from Matheson. The Lightning River Gold Mining Company has let a contract for sinking a shaft to a depth of 50 feet.

Wright-Hargreaves

During the third quarter of 1921 the Wright-Hargreaves mill handled an average of 136 tons of ore daily and recovered an average of $14.15 from each ton treated. Including the premium on gold, the company realized an income of $15.50 on each ton of ore going through the mill. Total income for the first three months was $194,420, and was therefore the highest in the history of any mine in the Kirkland Lake district. In view of the mill beng designed to ultimately treat about 175 tons daily, it is obvious that the Wright Hargreaves stands in line to ultimately realize an income of around one million dollars from the present plant.

Kirkland Lake.

During the third quarter of 1921 the Kirkland Lake Mining Company produced approximately $70,090. The mill treated an average of 125 tons daily, or a total of 11,489 tons during the period. Recovery averaged $6.10 per ton, plus the premium, which brought the income up to approximately $6.70 from each ton of ore sent through the mill.

Ontario-Kirkland

The Ontario-Kirkland mill is in operating condition again, after suffering a delay through breakage in the hoisting equipment.

Comfort-Kirkland

Good progress is being made on the property of the Comfort-Kirkland Gold Mines, and the prospects on this property are very favorable. The company has been financed chiefly in Toronto, and the enterprise is being conducted along conservative and efficient lines.

The Comfort-Kirkland lies directly between the Ontario-Kirkland, which is now producing gold, and the Hunton-Kirkland, on which exceptionally rich gold showings are in evidence. Up to the present time, work on the Comfort has consisted of surface exploration as well as sinking a shaft to a depth of 150 feet, at which point lateral operations are now under way. Already a number of small veins have been encountered, but it is the intention of the management to keep on cross-cutting with the object in view of picking up the westerly extension of the orebodies which have been developed extensively on the adjoining Ontario-Kirkland.

King-Kirkland

An official statement has been issued by the King-Kirkland Gold Mines, confirming information presented recently in these columns. The statement points out that the plan to increase the capitalization to 5,000,000 shares was ratified, and that the company owns its original property plus the two Ferguson claims, and with only 1,650,000 shares of stock issued.

Regarding future plans the statement says: "We have already purchased two 80-h.p. boilers, locomotive type, and placed an order for a new Ingersoll-Rand compressor, capacity six drills, cross-compound, convertible for steam or electric motor drive. This machine is under contract to be delivered Feb. 1st, 1922. * * * The power house and new cook camp are under construction, and when completed, with the machinery installed, we will sink the present shaft deeper and carry on extensive underground operations."

COAL RESOURCES.

A complete and authoritative work on the coal resources of the world was published in connection with the meeting of the International Geological Congress held in Canada in 1913. It may be of interest to readers to know that this three-volume work with accompanying atlas, which originally sold for $25.00, can now, be had at a cost of $100.00 per set by applying to the King's Printer, Ottawa.

British Columbia Letter

Nanaimo District.

While the actual mining done during 1921 in the Nanaimo Mineral Survey District, which takes in Vancouver Island and a considerable section of the British Columbia lower mainland, has not been equal to average years, it would appear from a report prepared by Wm. M. Brewer, resident mining engineer, that there has been considerable development work and a general tendency displayed by operators and owners of prospects to prepare their properties, in order that the better markets and the greater prosperity of the early future will find them ready to take the fullest advantage of the improvement.

After referring to the burning of the Concentrating Mill at Britannia and to the more recent flood disaster, Mr. Brewer proceeds:

"The concentrating mill at Britannia was closed down on November 30th, 1920, and the mill at the Indian Chief Mine, Sidney Inlet, West Coast Vancouver Island, was also closed down about the same time, while production at the Marble Bay Mine, Texada Island, ceased during 1920. As these were the only producing metalliferous mines in the Western Mineral Survey District, and no others have been added to the list during 1921, consequently when considered from a production basis the condition of the metalliferous mineral industry in this District during 1921 has been discouraging, but on the other hand, when the results from the development work and prospecting that have been carried on during the year in various sections of the district are considered, there is every reason for a feeling of optimism to prevail with regard to the future condition of the industry."

Shipped Iron Ore.

The administration of the "Iron Ore Supply Act, 1919," occupied considerable time during the month of May, when acting on instructions from the Honourable Wm. Sloan, Minister of Mines, the writer made a shipment of 502 sacks of magnetite, weighing 45,000 pounds, from the Lake Mine, on the west side of Texada Island, owned by the Puget Sound Iron Company to Thomas Summerson & Sons, Limited, Darlington, England, also a smaller shipment to W. Perrins of Nanaimo for experimental purposes.

The Consolidated Mining Smelting and Power Company of Canada have had parties of Mining Engineers engaged in field work prospecting the section of Vancouver Island known as the E. & N. Railway belt, but no results from that work have been made public. This examination was made by the smelting company at the request of the E. & N. Railway Company, and in accordance with an agreement entered into by the railway company with the Honourable the Minister of Mines, in an effort to consummate some arrangements by which the present coal control of the minerals in the railway belt can be eliminated. At present the E. & N. Railway Company are the owners of all coal and base metals occurring within the boundaries of the railway belt, while the title to any precious metals occurring within that belt are in the Crown.

Referring to his own activities during the Summer of the past year Mr. Brewer says in part:

Nearly all of the month of July was devoted to a visit to Tatlayoko Lake and Klina Klini River Sections on the mainland in the extreme northerly part of the Nanaimo Mining Division, which owing to the lack of any trails from the coast from either the head of Bute or Knight Inlets can only be reached, at the present time, by travelling into the Chilcotin Country and crossing the low summit between Chilco and Tatlayoko Lakes.

The chief point of interest in this part of the Nanaimo Mining Division is that within its boundaries the Easterly boundary of the grano-diorite batholith of the Coast Range is found to follow an irregular line and the contact between those granitic rocks and the sedimentaries of the interior can be traced. This fact is also referred to by Wm. Fleet Robertson, Provincial Mineralogist, in his report on the Tatlayoko Lake section published in the Annual Report of the Minister of Mines for 1910, in which he also draws attention to the possibilities of the section as a promising field for productive mineral deposits to occur.

The writer during his trip examined the property of the Tatlayoko Lake Gold Mining Company, Limited, near the foot of Tatlayoko Lake. At the headwaters of the Klina Klini River he examined the iron ore property

Later in the season a trip was made to Siwash Creek near the head of Powell Lake where the *Copper Bowl* group of mineral claims was examined. Near Olsen landing on Powell Lake, the mineral claims owned by George Kennedy and Jack Howse, were examined. The *Ophir* and *Shamrock* mineral claims near Powell Lake, about three miles from the Powell River Pulp Mill were also examined on this trip. Development work has been done to all of these above mentioned prospects.

Powell Lake Section.

It is interesting to find that the ore deposits on the properties mentioned in the Powell Lake section on Siwash Creek, occur in a zone of metamorphosed sedimentary rocks, one of the roof pendants as described by Chas. Camsell and other geologists as occurring as inclusions in the grano diorite batholith of the Coast Range. The values carried by the ore range from traces to 0.42 oz. in gold; from trace to 43.2 oz. in silver and from 0.5 per cent to 1.3 per cent in copper.

Texada Island.

On Texada Island development work has been done during 1921 which has been examined during the past season. This work has been chiefly confined to the Marble Bay Mine, the *Marblehead* and *Majestic* groups, and work done by John D. Edwards on a group of mineral claims near Gillies Bay, Texada Island.

Quadra Island.

On Quadra Island development work during 1921 has been confined to that done on the *Wanderer* and *Prospector* mineral claims near Deep Water Bay, which were examined in June last. Samples from these claims assayed: Gold, trace; Silver, 1.8 oz.; Copper 19.0 per cent. and gold, trace; Silver, 1.8 oz.; Copper 15.5 per cent.

Silver Leaf Claims.

From June 23rd to 26th was occupied in examining the *Silver Leaf* and *Mountain Ash* mineral claims owned by Thos. Service of Cowichan Lake. These are on a small creek, one of the headwaters of the Jump River which flows into the south fork of the Nanaimo River. The interesting feature about this property is the values carried by the ore which occurs in a well defined vein in a shear zone. The samples from the *Silver Leaf* claim, assayed:

Gold oz.	Silver oz.	Copper, p.c.
0.32	2.2	14.5
0.66	2.0	3.7
0.2	1.2	4.7
0.2	0.4	11.2

Samples taken in October by the owners from the same claim, after some development work had been done, assayed:

Gold oz.	Silver oz.	Copper. p.c.
0.80	1.6	5.5
0.66	1.0	5.0
0.86	1.4	5.1

Vancouver Mining Division.

In the Vancouver Mining Division the development work done during 1921 has been confined almost exclusively to that done by the Britannia Mining and Smelting Company on the Britannia Mine, also by D. McKinnon, D. McCallum and O. W. Rafuse, on Bay Creek, a tributary of the Stawamus River and by J. Habrick on the Indian River.

The Britannia Company has kept about 250 men employed in extending the development work in the mine and blasting out available ore. This work has resulted in largely increasing the tonnage of ore in sight, as well as exposing bodies of ore carrying very much higher values in copper than the usual run of mine ore heretofore worked.

The development work done on Bay Creek during the past year has resulted in determining the occurrence of what may be termed as the pay shoot in the wide zone of schist. Samples taken at the time an examination was made by the writer early in September, assayed from 0.1 per cent to 6.8 per cent in copper.

Victoria Mining Division.

The only activity in the mining industry in the Victoria Mining Division during 1921 has been the prospecting work done on the Gabbro Group of mineral claims, which adjoins the Sunloch Group on Jordan River. A company known as the Gabbro Copper Mines, Limited, non-personal liability, was formed, with Geo. E. Winkler for President, which did considerable systematic prospecting work, during which it was discovered that some of the ore occurring on the group carried values in nickle.

West Coast Vancouver Island.

From September 10th to October 7th last the writer's time was occupied in making examinations in the Alberni, Clayoquot and Quatsino Mining Divisions where there has been but little during 1921.

The chief feature of interest is the opening up of the *You* Group of mineral claims on Ptarmigan Mountain about 15 miles from the head of Bedwell Sound, Clayoquot Mining Division, at an elevation of about 2,700 feet above sea level.

The development work is being done on a narrow quartz vein which fills a fissure in granodiorite country rock. Samples of the quartz vein filler, assayed:

Gold oz.	Silver oz.	Copper. p.c.
6.92	0.8	Nil
3.56	3.4	0.2
2.92	2.6	0.5

Omineca and Cariboo.

All the vast territory known as the Omineca, the Peace River District, and the Cariboo are included in the area over which John D. Galloway, resident mining engineer at Hazelton, B.C., has jurisdiction so that it is interesting to find him observing, in a recent report regarding mining conditions in 1921, that, considering adverse conditions, the condition of the mining industry in that section has been better than might have been expected.

"While but little lode-mineral production was made," he proceeds, "a substantial increase in the placer gold output as compared with 1920 is an encouraging sign for the future.

"Development of mineral properties was proceeded with in many parts of the District and more prospectors were in the hills than for some years past. Besides the actual exploratory work of looking for new mineral discoveries much work is done in the course of a season by prospectors on the properties that they own. In quite a number of instances of work of this nature done this summer the showings of ore have been improved and the general results very satisfactory. There are now in the North-eastern District a considerable number of prospects, carrying a great variety of ores and metals, which should prove attractive to those who are looking for prospects that have some chance of developing into profitable mines.

Placer mining was vigorously prosecuted in the Cariboo and the indications are that the yearly placer gold production of that section will soon again increase to equal that of pre-war years. Particularly interesting is the re-opening of the old *Bullion* mine at Quesnel Forks, which property was at one time the most important hydraulic mine in British Columbia.

The *Silver Standard* mine and concentrating mill at Hazelton was closed all year but it is expected that operations will be resumed in the spring of 1922. The condition of the mine is satisfactory and the reason for closing down near the end of 1920 was owing to the difficulty of marketing silver-lead and silver-zinc concentrates.

The development of a very promising coal property on the Telkwa river was commenced during the year. This property, known as the *Betty* mines, has a thick seam of good grade coal which will prove highly satisfactory as a steam coal or as domestic fuel. The operations at the mine are as yet on a small scale but once the high quality of this coal is known, it will command a good market. The opening up of a source of a steady supply of good coal will undoubtedly assist the growth and prosperity of Nothern British Columbia.

As far as is known the only ore shipment made this year was a carload of concentrates from the Silver Standard (clean up of mill bins), a shipment from the *Hazelton View* and a few tons as test shipments from different properties. The production of placer gold is estimated at $80,000 as compared with $69,000 in 1920. The coal shipments from the *Betty* mine are estimated at 865 tons.

COAL BRIQUETTING.

We have received from the Mashek Engineering Company, Inc., 90 West St., New York City their catalog No. 5 on Coal Briquetting Machinery and Plants.

This catalog contains 129 pages, and approximately one-half of it is devoted to the question of briquetting of different fuels, descripticns of different commercial binders that are available, costs of manufacture, approximate costs of plants, and especially the article on Lignite, which is of considerable interest to the Canadian mining companies, is covered in a thorough manner after making exhaustive laboratory and commercial tests on the different lignites, their method of reduction by partial and complete carbonization and briquetting so as to convert these fuels into coal equal in heating value to Pennsylvania Anthracite and practically smokeless. Part of this catalog contains descriptions and illustrations of machinery, photographs of plants erected, and reduced working drawings which will give engineers considerable information as to what briquetting involves.

The price of this very complete reference book is $2.00 but Mr. G. J. Mashek advises us that a copy will be gladly sent free to anyone engaged in coal mining or coal merchandising or to consumers or investors who may be interested in the briquetting of fuels in the future provided the request is sent on their letterhead.

ANOTHER WAGE REDUCTION PENDING AT MINES OF NORTHERN ONTARIO

The silver mining industry in the Cobalt district is on the eve of another drastic readjustment in the costs which enter into the work of producing silver. The tendency is still downward, and is made inevitable by reason of it being impossible for only such mines as the Nipissing and O'Brien to feel secure under the existing conditons when the cost of producing silver clings so closely to the value which the metal commands on the open market.

Work is also being carried on profitably by the Mining Corporation of Canada, the Coniagas and the La Rose Consolidated, but the margin of net profit is not commensurate to the capital and the effort involved.

In the continued slow decline in the cost of supplies, and in a further reduction in wages to the miners lies the security of the majority of the mines. Not only this, but in such a concerted readjustment lies reasonable assurance that a number of the mines which are at present unable to operate may be reopened.

Miners are available in large numbers, but the present high rate of pay has caused total working forces in Cobalt to be reduced to around 1,000 men. These high wages preclude the possibility of any general resumption of work on present idle mines.

From the point of view of the mining companies, a reduction in wages would be extremely beneficial. From the viewpoint of the present workers in the mines, such a reduction would probably meet with opposition. However, from the standpoint of benefit to labor as a whole and to the community and country in general, a reduction in wages might reasonably be for general good. The fact is that such a readjustment would pave the way to the employment of possibly 50 per cent more men than at the present time.

As matters stand, the skill of many experienced miners is being lost on the handles of axes or on the ends of cross-cut saws in the lumber woods at from $25 to $30 per month. These men, unable to secure work at from $4 to $4.50 per 8-hour day in the silver mines, are working for $1 per day in the lumber camps, where 10 hours per day is a minimum. The question is, would they not be better off working at from $4 to $3.50 per day at the mines?

The writer has made inquiry and has learned that with such a reduction in wages, such properties as the McKinley-Darragh, Beaver Consolidated and Temiskaming could be operated on a moderately profitable basis. As in the case of the McKinley-Darragh, the mine and mills are lying in idleness, instead of producing half a million ounces of silver annually and offering employment to at least 100 men, and thereby contributing a substantial pay-cheque monthly to at least 100 homes. There are 25,000 tons of broken ore in the McKinley-Darragh and there are a number of points in the mine where ore of a medium grade may be mined. This work could be carried on at least without loss under a wage scale of $3 to $3.50 per day, but is quite impossible when paying men $4 to $4.50.

The question may be asked: Why do not the mine operators take steps to adjust the wage scale to a point where the idle mines could be operated without loss? The answer to this is difficult to find, unless it lies in part in the fact that the reduction of 15 per cent. made last spring has not yet been followed by a cut at the gold mines farther north, and perhaps in part to the fact that the present producing concerns are not anxious to disturb the present harmony between employer and employed.

At Cobalt the Nipissing is the leading employer of men and has been meeting with favorable developments which assure good profit without cutting down expenses.

At Porcupine, the Hollinger Consolidated is the leading employer, and where also there is a tendency to defer wage reductions due to the enterprise being on a highly profitable basis.

These two big mines are probably directly responsible for the present wage scale having been continued throughout the past several months, but there are gathering signs of early action on the part of certain of the other important mines to reduce expenses, and there is likelihood of an endeavor being made to have the situation cleared up before the arrival of spring, at which time the activity in both the silver and gold mining industries promises to become extremely widespread.

TORONTO MINING QUOTATIONS.

Quotations on Active Stocks on Standard Stock Exchange, Toronto, 20th December, 1921.

	High	Low	Last
Silver			
Adanac Silver Mines, Ltd.	1¼	1	1
Beaver Consolidated	24	21½	21½
Coniagas	1.50	1.30	1.30
Crown Reserve	9½	9½	9½
La Rose	35	32¼	35
McKin.-Dar.-Savage	15½	15	15½
Mining Corp. of Can.	1.15	1.15	1.15
Nipissing	7.60	6.25	7.57
Silver Leaf	1	1	1
Temiskaming	25	25	25
Trethewey	9¾	9	9¾
Gold			
Apex	1¼	1	1¼
Atlas	10½	6	6¼
Dome Extension	71	71	71
Dome Lake	5	5	5
Dome Mines	20.90	19.75	19.95
Gold Reef	1¾	1¼	1½
Hattie Gold M. Ltd.	25	20	25
Hollinger Cons.	7.84	7.76	7.79
Keora	10	8	9⅜
Kirkland Lake	32	28	28
Lake Shore M. Ltd.	1.22	1.19	1.20
McIntyre	2.00	1.95	1.97
Moneta	7¾	7	7
Newray Mines, Ltd.	4½	4½	4½
Porcupine Crown	12½	12	12
Porcupine Tisdale	⅝	⅝	⅝
Porcupine V. N. T.	18	17	17¾
Preston East Dome	2⅞	2⅞	2⅞
Schumacher	35	29	31
Teck-Hughes	16	14½	15½
West Dome	6	5½	5½
West Tree Mines Ltd.	3	3	3
Wasapika Gold M. Ltd.	3¾	3	3
Miscellaneous.			
Petrol Oil	17½	16¾	17½
Vacuum G.	5	5	5

The Sale of Shares

Commenting on the proposal made by mining exchange brokers that sales of shares in mining enterprises should be limited to stock brokers, the "Northern Miner" says:

So many of the Northern Ontario mines have been financed by interests unassociated with exchanges that the question as to whether it would be a wise move to limit all future financing to brokers will not find general agreement in answer. For instance, the two latest gold-producing companies, Wright-Hargreaves and Ontario-Kirkland, were financed by private interests almost entirely. Some of our best prospective properties, notably the Bidgood, are finding their money privately, without benefit of brokers.

The Standard Exchange would like to see stocks of all mining companies listed upon the company securing sufficient money to develop its properties. In a sense, this opinion is not subscribed to by "promoting brokers" of the exchange, for some of the members are promoting companies which they have seen to it are not listed.

Whether a stock should be listed before the property has reached the producing stage is decidedly a debatable point. Our opinion, based on what would do the mining industry most good, is emphatically that no stock be listed until at least a full year after the full development money is raised. During the period of development most properties pass through half a dozen crises, and if the stock is listed it becomes a football for speculators. A few shareholders who want to sell out are given a chance to do so when a stock is listed, but the large majority of shareholders, who bought originally with the set purpose of sticking to the end, see their interest greatly damaged by boardroom speculators. If the company requires more money than originally thought necessary (and it is difficult to estimate in advance how much development money will be required), it is likely to be severely handicapped if the stock has been depressed by market manipulation. There are cases illustrating this on the Standard board today; mines that require new financing cannot get it because the shares are at such low levels as to make a new issue unattractive or insufficiently productive of funds. Unless artificial means are resorted to, and the quotations run up, these promising properties will remain half-developed and idle.

What must be sought is the encouragement of speculation in mining enterprises and the discouragement of gambling in mining stocks.

To our mind the fact that so many people have been bitten while gambling in mining stocks is the reason why it is often difficult to interest investors in mining.

Looking over the recent flotations, the key to success of the most important was the pooling of all stock. Those who invested in the first place with the idea of speculating in the outcoming of a mining enterprise are protected against those whose purpose is to make money purely on the stock. The striking manner in which holders of pooled stock have stuck together through all kinds of weather is proof that mining enterprise is the intention of the great majority.

Anything that will encourage people to invest in a mining enterprise is very much needed. What keeps much money out of mining is the fear that a stock will be raided and a company's operations crippled. Marketability of a mining security is a desirable feature but it is a secondary one to the unhampered development of a property.

Trading in Shares and the Promotion of Mining Enterprises

Commenting on the proposed "blue sky" laws and on trading in mining stocks, a writer in the Toronto "Telegram" says:

There is no objection to established mines being upon the trading lists of the brokers. Every shareholder of mining stock likes to know from day to day just what he can get for his shares should he want to sell them at a moment's notice. There is just as much justification for the listing or trading in Dome, Hollinger or McIntyre as there is in the shares of the Bank of Montreal or the C.P.R. These are commodities representing going solvent concerns, and are just brought into the market. The necessity of bringing as substantial in a way as potatoes or other produce an indefinite number of buyers and sellers together and striking a ruling daily price has become a feature of modern commerce.

But the promoters of undeveloped properties argue that the stock exchange, which performs an indispensable function in dealing with commodities of established value, becomes an abuse and a detriment when it assumes the control of shares in properties which are only in the making stages. With properties like the three Porcupine leaders there is a close connection between the market price of the stock and its earning power. The fluctuations in these arise from the expectation of a higher or lower dividend due to the inherent changeability from time to time of the ore values, cost of labor, power, etc. But always the basic relation is preserved between the value of the mine as a producing business and the reflected value of its stocks in the open market. The gamble element is on an elastic band which however is always tied to a steadfast centre. And this is rightly recognized as legitimate when good faith is preserved in company reports.

But the situation is different when an undeveloped property must go to the public for its funds. There are two ways of doing this. The company may, as did the Associated Gold Fields of Larder Lake, make a private campaign for funds by selling stock and protect their price by obliging each subscriber to agree to a pool of his purchased stock for a given period. In this way, the stock is protected from the erratic prices of a gambling market where the value of the stock bears no relation to anything proven in the mine. But this first is a slow and painstaking method of filling a treasury with funds. Most people are reluctant to tie up money for a long period, and besides the mining investor usually is induced by the hope of making a quick turn over and landing a long shot. The thought of high return urges them to take a chance and makes them easy victims to the second and most favored way.

What happens when the company in need of funds and with perhaps good surface showings goes to the broker? We are not dealing with the wild cat promoter, who has no intention of developing, but is quite willing to fall in line with the broker's terms provided he can unload a block of promotion stock himself before the stock is kicking about the bottom of the scale. We are speaking of the honest intentioned promoter

who have faith in their property, who have put their limited capital into getting it into shape and obtaining competent engineers' reports on their mineral, but who need further funds to carry on to the producing stage. These are the people who complain that the quotation of a daily arbitrary market price out of all connection with any proved merit in their property is a detriment to their continuance of work.

The broker will say, "Well, this is altogether a gamble and if I am to underwrite the stock I must have a good whack." If he underwrote in the sense that he put up a cheque for an amount which would provide funds enough to carry work to completion, then one would not grudge his getting the stock at a figure much lower than that at which he would put it out to the public for consumption. In that case he would run the risk that future developments might fall short of all that the engineers had promised.

In the early Porcupine days many properties were financed in this way, and a heavy buying public, under the influence of the Hollinger success, even subscribed enough to do considerable work on the numerous properties lying about an area radiating from the Hollinger and Dome. A broker of long experience has a large list in Canada and the States, and though the price per share is small, it rains in when times are good. There are scores of properties with plants and buildings and shafts full of water, and a solitary watchman. What happened to them?

This is what happened to them, and will always happen when small capital starts in at gold mining without funds in sight to carry to the producing stage. They work piece-meal, closing down and opening up as funds run out and are replenished by additional stock sales, thus adding greatly to their cost and inefficiency, to say nothing of interest on their investment. In a good period they may drag along looking ever forward to the day when a strike of phenomenally rich values will bring in a flood of investors, and wilfully oblivious to the fact that these abnormal values never persist as a milling condition, and that rock mining is a tonnage and milling business. The broker gets tired holding up the value of the shares and dumps his loose stock for what he can get for it, two cents is high when he gets it for nothing, the stock slumps permanently, the mine is finally closed down and the stock remains a forlorn name on the broker's list, a dead stock.

Now here is where the honest developers protest. They still have a big bunch of treasury stock, and their mine prospects are no worse nor better than when they started, except that they may have accomplished some sinking and drifting, and have an equipment to go on with. But their stock is still listed at half a cent or a cent, and how induce any financiers to buy treasury stock at ten or fifteen cents when they can buy it at one cent on the market. And if they buy there that does not fill their treasury.

And moreover, in a great many cases, the stocks have been dealt in if not actually listed upon the exchange without the consent of the company. They argue that they should have enough control over their shares to prevent them being sold in open market and a fictitious price put upon them. If the company is a going concern, a paying business, then they don't care how much their shares are quoted, that doesn't affect their business. But until they are on their legs and producing, it certainly does militate against their getting funds to fill their treasury to have their shares quoted at a fraction of a cent. And if a strong buyer of treasury stock should be encountered and the stock run up on the market, the one to profit most would be the broker, who can dump his remaining shares at a good figure after practically wrecking the company.

There are two sides to every question, but if any protective legislation is intended it should have reference not only to the publication of prospectus reports, but also to the meethods of brokers.

METAL QUOTATIONS.

Following are the fair average prices for ingot metals (in less than car-loads) at Toronto, 20th Dec.:

	Cents per lb. (Unchanged since last week.)
Copper, Electric	18½
Copper, Casting	17¾
Tin	38½
Lead	7
Zinc	7½
Aluminum	27
Antimony	9

COAL WASHING.

The investigation of bituminous coal washing practice in the Middle Western States, being conducted by the United States Bureau of Mines, the mining department of the University of Illinois, and the Illinois Geological Survey in cooperation, has been extended by a survey of methods in use in Alabama. The object of the work is to conserve coal resources by minimizing coal losses and to increase the utilization of Middle Western coals for coking and other purposes by reducing the sulphur and ash content. A number of coals have been examined in the field and at the laboratory in order to determine the practicability of washing them. Coals from Clay County, Ind., and from Columbiana County, Ohio, have been washed successfully. Particular attention has been paid to the cleaning of coal on concentrating tables, and to a determination of the factors that affect the washability of coal.

For the purpose of aiding the industry in securing washing plants adapted to cleaning a particular coal, data have been collected for a bulletin describing methods to be used in the examination of a coal to determine the general type of washery required.

PERSONALS.

A meeting of the Toronto branch of the Canadian Institute of Mining and Metallurgy was held on Saturday, Dec. 17. Mr. David White of the U. S. Geological Survey addressed the meeting, his subject being resources of coal and oil.

A number of geologists and engineers are in Toronto for the meeting of the American Association of the Advancement of Science. The program includes several papers and discussions that should prove interesting to mining engineers.

Sir Clifford Sifton is to address the Association on Natural Resources and the National Welfare.

Among the mining engineers on the program are Mr. Brigham manager of the Hollinger and Mr. John Hardman the veteran engineer from Montreal.

The Toronto members of the Women of the Mining Industry will entertain visitors at a dinner to be held on next Friday evening. A number of members of the Mining Institute will on the same evening attend a dinner being arranged for by the Engineering section of the Association.

Mr. Robt. A. Bryce has moved his office from the Bank of Hamilton Bldg., to 8 Wellington St. E. Toronto.

The Canadian Miners' Buying Directory.

Acetylene Gas:
Canada Carbide Company, Ltd
Prest-O-Lite Co. of Canada, Ltd.

Acetylene Welding:
The Toronto Iron Works, Ltd.

A.C. Units:
Powley & Townsley, Limited.

Agitators:
The Dorr Co.
Can. Chicago Bridge & Iron Co., Ltd.
Horton Steel Works, Limited.

Air Compressors:
Belliss & Morcom, Ltd.
Laurie & Lamb

Air Hoists:
Canadian Ingersoll-Rand Co., Ltd
Mussens, Limited.

Air Receivers:
The Toronto Iron Works, Ltd.

Alloy and Carbon Tool Steel:
Peacock Brothers Limited.

Alternators:
MacGovern & Co.

Aluminium:
Spielman Agencies, Regd.

Amalgamators:
Northern Canada Supply Co.
Mine and Smelter Supply Co.
Wabi Iron Works.

Antimony:
Canada Metal Co.

Antimonial Lead:
Pennsylvania Smelting Co.

Assayers' and Chemists' Supplies:
Dominion Engineering & Inspection Co
Lymans, Limited
Mine & Smelter Supply Co.
Pennsylvania Smelting Co.
Stanley, W. F. & Co., Ltd.

Ash Conveyors:
Canadian Link-Belt Company

Ashes Handling Machinery:
Canadian Link-Belt Co., Ltd.

Assayers and Chemists:
Milton L. Hersey Co., Ltd.
Campbell & Deyell
Ledoux & Co.
Thos. Heys & Son
C. L. Constant Co.

Asbestos:
Everitt & Co.

Balls:
Hull Iron & Steel Foundries, Ltd
Peacock Brothers Limited.
The Wabi Iron Works.
The Hardinge Conical Mill Co
The William Kennedy & Sons, Ltd.

Ball Mills:
Hardinge Conical Mill Co.
Hull Iron & Steel Foundries, Ltd
The Wabi Iron Works.
The William Kennedy & Sons, Ltd.

Babbit Metals:
Canada Metal Co.
Hoyt Metal Co.

Ball Mill Feeders:
Hardinge Conical Mill Co.
Hull Iron & Steel Foundries, Ltd

Ball Mill Linings:
Hardinge Conical Mill Co.
The William Kennedy & Sons, Ltd.
Peacock Brothers, Limited
Hull Iron & Steel Foundries, Ltd.

Belting—Leather, Rubber and Cotton:
Canadian Link-Belt Co., Ltd.
The Mine & Smelter Supply Co.
Northern Canada Supply Co.
Jones & Glasco.

Belting:
R. T. Gilman & Co
Gutta Percha & Rubber, Ltd.

Belting—Silent Chain:
Canadian Link-Belt Co., Ltd.
Hans Renold of Canada, Limited, Montreal
Jones & Glassco (Regd.)

Belting (Transmission):
Goodyear Tire & Rubber Co

Belting (Elevator):
Goodyear Tire & Rubber Co

Belting (Conveyor):
Goodyear Tire & Rubber Co
Gutta Percha & Rubber, Ltd.

Bins and Hoppers:
The Toronto Iron Works, Ltd.
Can. Chicago Bridge & Iron Co., Ltd.
Horton Steel Works, Limited.

Blasting Batteries and Supplies:
Canadian Ingersoll-Rand Co., Ltd
Mussens, Ltd.
Canadian Explosives, Ltd.
Powley & Townsley, Limited.

Bluestone:
The Consolidated Mining & Smelting Co
The Conlagas Reduction Co., Ltd.

Blowers:
Canadian Fairbanks-Morse Co., Ltd
Northern Canada Supply Co.

Boilers:
Canadian Ingersoll-Rand Co., Ltd
Marsh Engineering Works
R. T. Gilman & Co.
The John Inglis Company
Wabi Iron Works.

Blue Vitriol (Conlagas Red):
Canadian Fairbanks-Morse Co., Ltd

Bortz and Carbons:
Diamond Drill Carbon Co.

Boxes, Cable Junction:
Standard Underground Cable Co. of Canada, Ltd
Northern Electric Co., Ltd.

Brazilian Rough Diamonds:
Diamond Drill Carbon Co.

Brazilian Mica:
Diamond Drill Carbon Co.

Buggies, Mine Car (Steel)
Hendrick Manufacturing Co.

Brazilian Ballas:
Diamond Drill Carbon Co.

Brazilian Rock Crystal:
Diamond Drill Carbon Co.

Brazilian Tourmalines:
Diamond Drill Carbon Co.

Brazilian Aquamarines:
Diamond Drill Carbon Co.

Bridges—Man Trolley and Rope Operated—Material Handling:
Canadian Mead-Morrison Co., Limited

Bronze, Manganese, Perforated and Plain:
Hendrick Manufacturing Co.

Buckets:
Canadian Ingersoll-Rand Co., Ltd.
R. T. Gilman & Co.
Hendrick Manufacturing Co.
Canadian Link-Belt Co., Ltd.
Marsh Engineering Works
Mussens, Ltd.
MacKinnon Steel Co., Ltd.
Northern Canada Supply Co.
The Wabi Iron Works

Buckets, Elevator:
Canadian Link-Belt Co., Ltd.
Hendrick Mfg. Co.
Peacock Brothers Limited.

Cable—Aerial and Underground:
Canada Wire & Cable Co.
Northern Canada Supply Co.
Standard Underground Cable Co. of Canada, Ltd
Peacock Brothers, Limited

Cableways:
Canadian Mead-Morrison Co., Limited
Fraser & Chalmers of Canada, Ltd.
Mussens, Ltd.
The Wabi Iron Works
R. T. Gilman & Co.

Cages:
Canadian Ingersoll-Rand Co., Ltd., Montreal, Que
Northern Canada Supply Co.
Fraser & Chalmers of Canada, Ltd.
The Electric Steel & Metals Co.
The Mine & Smelter Supply Co.
Mussens, Ltd.
The Wabi Iron Works

POSITION OF MINING CORPORATION OF CANADA AND McKINLEY-DARRAGH

By J. A. McRAE

After having curtailed operations for several weeks during the past winter pending a reduction in wages to the mine workers, and during which time the milling equipment was altered and added to, the Mining Corporation of Canada is rounding out another big year of production.

An oustanding feature in connection with operations during the past six months has been the large amount of ore coming from the Buffalo mine, which was purchased by the Mining Corporation last year. This old Buffalo property has been the chief source of production during the past several months.

While production has probably amounted to the equivalent of 75 per cent. of the total ore in reserve at the beginning of the year, yet it is learned that certain of the ore bodies have been found to extend well beyond their previously known limits, and which leaves the corporation with a substantial reserve on which to continue 1922 operations.

Success attending the purchase of the Buffalo mine on the one side has given rise to the belief that the purchase of the McKinley-Darragh Mine on the other side might reasonably be expected. It is conceded by those in close touch with these mines that the larger equipment on the Mining Corporation would enable this concern to handle McKinley-Darragh ore more cheaply than is possible in the mill on the McKinley-Darragh. Also, it has been learned that the matter of connecting up the underground workings could be quickly carried out through the old Cobalt Lake property which is a part of the Mining Corporation, and which lies immediately adjacent to the ore-bearing section of the McKinley-Darragh.

Considerable ore lies in the McKinley-Darragh, and the management is highly efficient. However, the ore being low grade, and the present wage scale being abnormally high, the only way in which the ore may be handled profitably is by some arrangement whereby it may be treated on a larger tonnage basis or under a greatly reduced wage scale.

On another page of this issue of the Journal will be found a discussion of the general situation which has compelled such mines as the McKinley-Darragh to remain in idleness and in a state of more or less deterioration.

Neither the Mining Corporation nor the McKinley-Darragh paid any dividends during 1921, but the prospect of more favorable conditions with the passing of time is expected to witness further substantial profit distributions from their operation.

BRITISH COLUMBIA NOTES.

Alice Arm, B.C.—Considerable road work has been done in the Alice Arm District in the past few months. There now is a good trail up the Illiance River Valley and the Provincial Mines Department has assisted in trail construction on the northeast fork of the Kitsault River as well as in other parts of the district. This is facilitating actual mining as well as prospecting.—The Moose Group, Kitsault River section, is rapidly taking a place as one of the most promising properties of the north. A considerable tonnage of ore is in the bunkers awaiting shipment, and development work, which still is underway, has disclosed a large body of ore.

Stewart, B.C.—The Bear River Bridge, which was washed out recently, is being re-placed by the Provincial Government. There will be no interference with mining operations in this section, therefore, because of the absence of transportation facilities.—R. L. Clothier announces that the Selvator Gp., situated on the south side of the Marmot River, will be worked all winter. There are some good showings on the property and samples of the ore have assayed high.

Vancouver, B.C.—Announcement has been made that the responsible managers of the Britannia Mining Company will be subjected to criminal prosecution by the Attorney-General's Department as a result of the recent flood disaster at Britannia Beach. Negligence on the part of the managers in regard to the protection of human life will be alleged, it is understood. It will be recalled that in this catastrophe some fourteen lives were lost.

Coalmont, B.C.—It is stated that a valuable discovery of amber has been made on the property of the Coalmont Collieries, Coalmont District, British Columbia. The opinion of Edwin S. Oliver, of the Oliver Chemical Processes Syndicate, in this respect, has been confirmed by reports based on samples forwarded to Ottawa and New York chemists. Mr. Oliver has been engaged in certain tests of the product of the Coalmont Mines and, while making a personal examination of the property, noticed a dump of supposed dross containing over two hundred tons. Through it was a yellow glassy substance that was hard to burn. Mr. Oliver's curiosity was roused and in laboratory tests of the strange substance the presence of succinic acid was disclosed. Since then further tests have been made and small quantities have been rendered plastic with catalytic oils and refined into a beautiful amber, pronounced by Ottawa authorities to be the true succinite or amber. Steps now are being taken by the Coalmont Collieries to handle the amber product apart from the distillation and by-products plant which has been under discussion for the treatment of coal and shale.

Trail, B.C.—During the last nine days of the month of November ore receipts at the Trail Smelter of the Canadian Consolidated Mining and Smelting Co. totalled 7,510 tons, bringing the total for the year to date to 372,109 tons of ore and concentrates. With one month to go there is a possibility of the record of 400,000 being established. Of the receipts for the nine days 7,072 tons came from the Company's Mines; 105 from the Josie, Rossland; 161 from the Knob Hill, Republic; 112 from the Surprise, Republic; and 53 from the Horn Silver, Similkameen, B.C.

Rossland, B.C.—Two tons of ore were shipped recently from the I. X. L. Mine, Rossland, to the Kellogg Smelter. For this a return has been received of 296 ounces gold and 47.5 ounces silver. Twenty tons of second grade ore gave a return of 4.195 ounces in gold and 5.75 ounces in silver per ton. The smelting company paid for the whole of the gold in the high grade ore and 96 per cent of the gold in the second grade ore at $20 an ounce and made a charge of $8 a ton for treatment.

Mr. E. S. Moore, dean of the Mines Dept. State College, Penna, is secretary of the Geological Section of the A. A. A. Sc., which meets in Toronto next week.

Mr. D. B. Dowling will present a paper on oil resources of the west at the Association meeting next week.

EDITORIAL

1921—A REVIEW.

The year just closing has been a trying one for many mining companies though a very successful one for some. The demand for many mine products has been far below the levels of previous years. Quantity of minerals produced has decreased considerably and the value has decreased greatly. A number of mines that have been steadily operated for some years were closed down during 1921 and many others are being operated far below capacity. A few mines, including the gold mines of Northern Ontario are making new production records and planning increased production, but these cannot in a short period of time show an increase comparable with the loss of output occasioned by the closing down of the nickel-copper mines at Sudbury.

The International Nickel Company's great mines and works have been closed down for some months, and the British America Nickel Corporation's plants have been idle nearly a year. The Mond Nickel company is still operating, but on a much reduced scale. The accumulated stocks of nickel are large and until there is a general resumption of business there will be no pressing need for more metal. For the present, nickel mining is not a profitable business.

While the Sudbury nickel industry is passing through a crisis, the other Ontario metal mining industries are doing fairly well and gold mining is prospering. The three companies operating big gold mines at Porcupine will all pay dividends in January. So also will the Wright-Hargreaves company which during 1920 joined the producers in the Kirkland Lake area. While the silver mining companies are not doing so well as the gold, it is worthy of note by the unduly pessimistic that the Nipissing pays a bonus in addition to its dividend in January.

Hollinger, McIntyre and Dome mines at Porcupine and Lake Shore and Wright-Hargreaves at Kirkland Lake all being operated very profitably. The Teck-Hughes is also reported to be making a profit on operations. It may confidently be expected that the gold mines of Northern Ontario will produce much more gold during the coming year than ever before and that the profits will be large.

Among the silver mines Nipissing has stood out even more prominently than usual during the year and has made discoveries of ore which make its prospects bright for the coming year. Less notable has been the success of the other silver mines; but those which have been operated have given a fair measure of good results. Several companies found operation impossible under the conditions as the costs have been too high for profitable operation at the ruling prices for silver.

In Quebec, the asbestos industry has passed through a poor year with a fair measure of success. Production was much lower and lower prices were obtained for the product; but efforts to keep the price up to a reasonable basis met with some measure of success. Some mines were closed down and output of others curtailed.

Coal mining in Nova Scotia, Alberta and British Columbia, while much below capacity, was fairly active and made a better showing than many of the metal industries. In Nova Scotia the slackness of business in the iron and steel industry naturally lessened the demand for coal. In the western fields also there was a slackening of demand owing to general depression in industries and smaller demands by railroads. On the whole, however, the production of coal was fairly well maintained.

The search for oil in the west attracted much interest during the early part of the year and the Mackenzie River district came to notice as a possible great oil field. The discovery of oil at Fort Norman brought into the district several exploration parties and in spite of transportation difficulties preparations were made for testing several properties. The short season closed without any very notable results and the enthusiasm has died. Those who are carrying on exploration work in the far northwest are convinced that there are possibilities there that warrant expenditure but they con-

sider that it will take some time to determine whether the Fort Norman field is likely to be an important addition to our oil resources.

MECHANICAL SHOVELS.

In all mining operations there is perhaps no part of the work that is so poorly done as the loading of cars underground from the floor of drifts and other mine openings. In nearly all cases in Canadian mines the ore and rock is loaded by hand into the tram cars, small pieces being shoveled and large blocks lifted by strong backed 'muckers'. Attempts to utilize machinery for this work have not as yet been very successful. In large openings some measure of success has been attained, but in the ordinary small mine opening the mucker has only his trusty shovel to aid him.

It is reasonable to expect that the attempts to make satisfactory mechanical 'muckers' will ultimately result in the design of small and efficient machines. During the past few years many underground car loaders have been in use in mines in America where conditions are for some reason specially favorable. Since it is from the operation of these machines that we may expect the development of useful small machines it is interesting to note what progress has been made.

In this number of the Journal we publish extracts from a report on underground loading devices used in metal mines, from investigations carried on by the U. S. Bureau of Mines. The data gathered by the investigators shows that progress is being made towards the design of machines suitable for small openings; but that we are still far from the goal.

IT CAN BE DONE.

At the recent meeting in Baltimore of the American Institute of Chemical Engineers, Dr. Raymond F. Bacon made strong claims for the research worker. He pointed out that with organization and determination we can overcome all obstacles and he incidentally let in a little light on some of the work done at Washington during the war. Dr. Bacon said in part:

"One of the greatest lessons of the war, which so far has gone almost unheeded, was that large-scale research can solve practically any problem. We had in Washington a research organization in which were gathered many of the best brains of the country. That research organization was able to solve every problem put up to it by those in command of the military forces. It showed that things which seemed to be impossible to do could be done and done in a rather short time by research backed by adequate resources of brain power and apparatus. The total cost of that organization, put together and run admittedly not at the highest efficiency in the stress of war time, was about two million dollars, and for this comparatively small sum no one could deny that results were obtained which did more toward winning the war than any two hundred million dollars spent in other ways.

"If this government would efficiently spend a few million dollars a year on war research, methods would surely be devised which would make us absolutely safe from attack without the necessity of maintaining such extensive army and navy organizations as at present."

While Dr. Bacon in his paper dealt particularly of the application of research to war purposes, his statements are of very general interest from the viewpoint of the solving of industrial problems. No problem is too hard for such a man as Dr. Bacon and when more men hold his opinions there will be greater use made of our resources. He is a firm believer in the ability of men to solve any ordinary problem. Those who are desirous of having more attention paid to research in industry will find Dr. Bacon's paper very interesting.

CONCENTRATION OF IRON ORES.

The magnitude of the problem before those who would take up the beneficiation, or concentration of Canadian Iron Ores is illustrated by the following quotation from the Mining and Scientific Press, concerning the plant that is being built on the Mesabi range of Minnesota.

"The narrow margin of profit that is anticipated when the entire plant is in operation is indicated by the fact that the present $4,000,000 unit is not expected to earn more than enough to cover the cost of operation; a plant of 22 units with a combined daily capacity of 75,000 tons of ore, rendering possible a wider distribution of the overhead cost, will be required to make the venture profitable. Steel is the backbone of industry and it is inevitable that the deposits of the eastern Mesabi should be utilized eventually. Let us hope that the time has arrived."

The operation of the great concentration plant at Babbitt is being watched with a great deal of interest, since success there would bring into the range of possible profitable operation some large low grade iron ore deposits. The comment of our San Francisco contemporary will attract attention to the fact that hope is being placed at present on the possibilities of large scale operations. The process is evidently not well suited for production on a small scale under present conditions.

ENGINEERING LEGISLATION.

Commenting on the Professional Engineers Bill which is to come before Ontario legislators at the next session the "Northern Miner" says: "Not one mine operator in the Cobalt camp is in favor of the bill that is being advocated by men who for the most part are not engaged in mining. Mine employees and mine employers are on common ground in their opposition to it. The actual makers of mines are against it. The bill where it relates to mining should be killed." Replying to a defense of the bill by Mr. James Hylands and criticism of the "Miners" opposition to a bill before "the men whose life interest at stake have passed on the merits of the bill" the "Miner" replies that there are others than the engineers whose "life interest" is at stake.

We are pleased to see that the "Northern Miner"

agrees with us. We believe that it is of interest to the mining industry that engineering work should as far as possible be done by capable men. We are not convinced, however, that this will be accomplished by legislation and we have more faith in the ability of employers to choose suitable men for certain duties which they will pay them for, than we have in the proposed engineering councils. We are moreover very doubtful whether the proposed legislation is so much in the interests of the industry and of the public as in the interests of engineers. And we are also convinced that no larger number of Canadian mining engineers are very much enamoured of the proposals.

In our opinion there would be very little attention paid to the effort to obtain this class legislation, were it not for the fact that such legislation has recently been obtained in many places. The chief thing that can be said in favor of it is that it is popular, and that it may not do a great deal of harm and possibly some good. We do not believe that it is needed nor that it will not do harm. Under ordinary circumstances there would be no great measure of support for it and advantage is doubtless being taken of the fact that it has been recently a popular fad.

Since such legislation is enjoying a wave of popularity it behooves mining engineers to recognize that the bill might meet with approval of the Ontario legislators. Under the circumstances some mining engineers have endeavored to see that the harm that may be done to industry by the bill is reduced as far as possible. It will be found that these engineers will be not greatly disappointed if the legislators disapprove of it. There are doubtless some engineers who really believe that engineering legislation is necessary and in the best interest of the industry. They are entitled to a fair hearing and we will be pleased to give publicity to their views. We may be mistaken in our view, but while we can see some possible good in such legislation, we are not convinced that there is much of good in it and we believe that there is no great demand for it from those engaged in the mining industry.

SCIENTISTS MEET IN TORONTO.

Toronto, Dec. 27. Some 2,000 men of science have been pouring into Toronto all day from every corner of the continent, from Belgium, from Mexico, and from Honolulu, for the 74th meeting of the association, invited to Toronto by the University and by the Royal Canadian Institute. The American Association, which is an amalgamation of all branches of scientific societies on the continent, represents in organized form the highest scientific achievements of mankind.

The American Association for the Advancement of Science is the central or general organization of a score or more of the great scientific and educational associations of Canada and the United States, and for three-quarters of a century it has assisted in the advancement of mankind along the paths to knowledge and achievement. Through its affiliated units it comprises a membership of nearly 12,000 persons, of whom, it is expected, at least one-fourth will attend the sittings of its seventy-fourth convention.

The feature of to-nights general session was the address of the retiring President, Dr. L. O. Howard. Dr. Howard is Chief of the Bureau of Entomology, United States Department of Agriculture, and one of the foremost entomologists of the day. Speaking of the value of research, Dr. Howard recalled the prophecies of his predecessors, of Sir William Crookes in 1898, and of Nichols, who, speaking at Baltimore in 1908, had said:

"We need not merely research in the universities, but universities for research. . . Beyond lies that future in which it will no longer be a question of supremacy among nations, but of whether the race is to maintain a foothold on the earth."

Had Britain acted upon the advice contained in the Presidential address before the British Association in 1903, Dr. Howard said, she might have found herself in better shape to confront Germany in 1914. Sir Norman Lockyer on that occasion had urged the necessity of wider research work and the establishment of a scientific national council.

Minerals in Patricia.

Among the papers of interest to readers of the Journal was one by E. M. Burwash on the resources of Patricia. Dr. Burwash, who spent last summer in exploring the terrain of Patricia, declared that its geology, resembling closely that of the area around Porcupine and Cobalt, held out promise of rich mineral resources.

Delegates to the convention evinced interest in a description by Dr. W. A. Parks, of the University of Toronto, of the recently-discovered Belly River dinosaur. This specimen, whose name, Dr. Parks said, meant "terrible reptile," was unique; it represented a new species and a new genus, and had been found by a Toronto expedition in the Bad Lands of Alberta. The new genus was characterized by an unusually low-set and massive body, and more particularly by its extraordinary head, the backward-set horn of which was longer than the head itself.

In "A Retrospect," W. G. Miller, Provincial Geologist for Ontario, recalled that it was during the first meetings of the A. A. A. S., over 70 years ago, that the terms "Huronian" and "Laurentian" were first used, and Dr. Miller emphasized the fact that friendly commingling of Canadian and American scientists in the long interval had been an important factor in preserving and promoting friendly relations between the two countries.

Prof. Ellis Thompson, University of Toronto, gave an entertaining account of a method of studying ores. By polishing the ore surface, he said, and examining it under a high-power microscope, the individual minerals it held might be observed at 1,000 times their natural size. Polishing of the specimen allowed its surface to act as a reflector, thus aiding the work of the mineralogist.

Following the close of the opening session, the members of the association were the guests of the University at a reception given in honor of the retiring president and the president in the hall at the rear of Convocation Hall.

No effort has been spared by the local committee to see that every need of the visitors is catered to. Up till a late hour last night nearly five hundred association members had secured quarters in the University residence, those of University College, Knox College, Victoria College, Wycliffe College and the women's residence in Queen's Park being pressed into service. At the University library a post office has been installed, telegraph service has been provided and an information bureau established.

Diamond-Drill Sampling Methods

By ROBERT DAVIS LONGYEAR.

From a paper to be presented at New York Meeting, American Institute of Mining and Metallurgy, February, 1922.

In diamond-drill work, a true sample consists of all the material cut by the bit—both core and cuttings. As the recovery of this sample is the object of diamond drilling, the utmost care should be taken to secure it. Speed of drilling and low costs are of little value if an inaccurate sample is obtained. The engineer in charge must study his material and lay out the plan of sampling, and then see that the drill runner follows his instructions; for the runner may be more interested in obtaining a large footage than in developing accurate methods of sampling.

When the core has been removed from the core barrel, it should be placed in a core box in the exact order in which it is taken from the ground. This box, is usually a shallow tray 4 or 5 ft. long, with partitions running lengthwise between which the core fits snugly. It is so designed that, after the cover is fastened in place, the core will retain its position when the box is moved. As the core from each run is placed in the box, a wooden block, upon which the depth of the hole is written, should be placed after the last piece or core. Each run is thus separated and shows the exact depth at which it was made. If the core is to be used for certain types of inspection, such as foundation testing, a mark on each piece should show which end was uppermost in the hole. This will prevent a piece being placed in the box in the reversed position. Frequent checks of the depth of the hole should be made with a steel tape.

In oil reconnaissance work, where the drill is used to determine the structure by establishing the elevations of certain key horizons, the essential information desired is the exact depth at which certain correlated beds are reached in different drill holes. It is, therefore, especially important to preserve the core in its original position in order to study the various criteria of correlation such as fossils, shale partings, color changes, and contacts. It is often desirable to have the runner keep a separate record of the depth of the harder and softer beds, as indicated by the pressure on the drill feed. This will serve as a check against the record given by the core.

The ideal sample of the material drilled would consist of 100 per cent. core of uniform size, but this ideal is seldom reached. In certain ores, the rich and softer streaks will tend to grind, so an analysis of the core that is left will not give the true grade of the material drilled. In such case, the cuttings or sludge must also be collected and analyzed. The correct grade of the ore is obtained by analyzing both core and sludge separately and combining the results.

In order to obtain a correct sludge sample, all of the water pumped down the rods must be returned, for if any is lost in crevices or in broken and porous rock part of the sample will go with it. To avoid this, the openings in the walls of the hole must be closed by casing, cementing, or other treatment. Care must be taken that the sample is not enriched or impoverished by material caving from the wall of the hole above the bit. If there is any tendency for this to take place, the casing must be kept well down toward the bottom of the hole. There are three methods in common use for collecting the sludge; the one to be adopted depends on the character of the material drilled and the results desired.

Method 1.—When the material shows little tendency toward concentration, the water may be run into a tub and allowed to overflow. Enough cuttings will be retained in the tub to furnish a sample. By this method, however, the sample is usually enriched, for the lighter particles are carried off; this method, therefore, is rarely satisfactory.

Method 2.—The sludge box will give much better results. This box is 12 to 18 in. wide, 6 to 10 in. deep, and 4 to 10 ft. long and contains two or more baffle plates to aid in the settling of the cuttings. The water may run into the box through a tee, or the casing may pass through a properly packed stuffing box or gland in the bottom of the box. Samples may be removed at any time that the rods have to be pulled, but preferably at 5 or 10-ft. intervals. In any case, care should be taken that core and cuttings represent the same interval in the hole. At the end of each interval, the drill is stopped and water pumped through the rods until the hole is clear of all cuttings and the return water clean. After the cuttings have settled in the sludge box, the top water is carefully siphoned or poured off, leaving the residue in the bottom. This is dried and quartered to convenient size for analysis or assaying, a representative sample being permanently preserved. This is the method most commonly used when diamond-drilling iron ore. In most ores, there may be considerable concentration of the heavier minerals, especially if the metallic content is small or if there is a great difference in specific gravity between the ore minerals and waste. The sludge box should be used only with due regard to its limitations.

Method 3.—In the third method, which is the most reliable, the return water is run into three or more barrels through a pipe or launder. When one barrel is filled, the pipe is swung to the next barrel, and so on. After the material in the first barrel has settled sufficiently so that the clear water can be siphoned off, the barrel is again filled. The process is continued until the end of the interval to be sampled. All of the material is then poured into one barrel and allowed to settle further. After all of the clear water has been drained off, the residue is removed, slowly dried over a fire, quartered, and sacked. The number of barrels used depends on the time necessary for the material in suspension to settle. When this method is used, the hole must be in such condition that all of the cuttings are washed to the surface. On one of the large copper deposits in Arizona, this method gave remarkably accurate results even though less than 50 per cent. of the core was recovered. Later test pits and mining operations checked the drill sampling within 0.005 per cent. in carbonate ore and 0.05 per cent. in sulfide ore. A bit recovering a 1 1/8-in. core was used. The choice of sampling methods must depend on the engineer's judgment of the character of the material to be sampled. In case of doubt, it is better to err on the side of accuracy than to risk getting a worthless sample.

It is often desirable to retain a complete core sample to show structure or banding and at the same time have a portion of the core analyzed, especially where the results of exploration are to be submitted to a prospective purchaser. In such cases the core may be split longitudinally by a core splitter; it is then possible to grind up one-half into a pulp for analysis while the other half is preserved in its original state.

Permanent Filing of Samples.

The method adopted for permanently filing samples

depends on the needs of the company doing the drilling. Sludge may be preserved in sacks and the core in the boxes. Some companies find it more convenient to keep the cores in drawers with partitions similar to those in the box; the core is then accessible for future study. In the Lake Superior iron district, nearly all the mining and exploration companies have filed both core and sludge in tin boxes 12 by 1½ by 1 in. with hinged cover. In the ore, the core recovery is small. Half the split core, or often a few representative pieces, are placed in the tin box with a sample of the sludge and the end of the box is properly labeled. A representative sample of the hard rock above the ore is kept also in the tin box. By this method samples can be stored in a relatively small space.

The foregoing is a brief description of a few of the common methods of collecting and preserving diamond-drill samples. Variations of these methods will suggest themselves on every new piece of work. The essential point to bear in mind in all diamond-drill sampling is that the sample must comprise all of the core obtainable and all of the cuttings. This involves the proper operation of the drill as well as the careful collecting of the core and sludge. The engineer must use his own judgment as to the practical methods that will give the desired results under the conditions obtaining.

COAL MINING ON VANCOUVER ISLAND.

After some general comments on the coal mining industry of Vancouver, in which it is stated that the production for 1921 is not likely to be as large as that of the previous year, Wm. M. Brewer, resident mining engineer, makes some interesting observations as to conditions that have obtained and recent developments.

He says: The great importance of the coal mining industry on Vancouver Island can be appreciated when it is considered that between 4,000 and 5,000 employees of the companies mentioned find continuous employment underground and on the surface under normal conditions, the year through. During 1921, the conditions can hardly be considered to have been normal because the demand for coal has been quite irregular, so much so that the Harewood Mine at Nanaimo, of the Western Fuel Corporation of Canada, was closed down from the end of February until July, and the Pacific Coast Coal Company, which employed a total of 286 employees during 1920, has been idle during the year 1921.

The relationship between employer and employee in the Vancouver Island coal fields has been quite harmonious during 1921. In October the Canadian Collieries (Dunsmuir) Limited, renewed the working agreement with their employees for two years from that month. As compared with other industries the world over the conditions of coal mining on Vancouver Island have been quite satisfactory, there has been no unemployment to cause agitation and the balance between supply and demand with regard to labor has been well adjusted.

During the past year the first really serious efforts have been attempted to improve the method of washing coal so as to save a large proportion of the slack coal, which has in the past been wasted. Successful experiments were made by P. E. Peterson, an acknowledged authority on the Oil Flotation method for concentrating metalliferous ores, in an attempt to apply that process to coal. The first experiments were made at the Granby No. 1 Colliery at Cassidy, but later Mr. Peterson became connected with the Western Fuel Corporation of Canada, where he is now engaged in reconstructing the washery plant. In the Annual Report of the Minister of Mines for 1921 the writer expects to be able to publish a full report on the improvements made in the washery plant, together with the results obtained as compared with the old system.

The importation of fuel oil for locomotive and steam vessels has, of course, had a very serious effect on the market for steam coal, the effect has not only been the direct one reducing the demand for coal but the indirect one of sending hundreds of thousands of dollars out of Canada in payment for oil and exchange. In order to endeavor to offset these very undesirable conditions, experts are working to determine the possibility of substituting powdered coal in place of oil. On this subject the writer expects to have considerable information for publication in the Annual Report of the Minister of Mines.

PRESIDENT CORLESS TO HON. MR. KING.

The great importance that the mining industry of Canada possesses is being impressed on the Premier-elect by the members of the mining fraternity, who are anxious to see a vigorous policy of encouragement and extension of the mines of Canada carried out by the new Government.

A number of mining men in Toronto met recently and forwarded to Hon. Mackenzie King a strongly-worded resolution asking for the appointment of an experienced and energetic Minister of Mines. The Canadian Institute of Mining and Metallurgy has now gone on record officially as favoring such an appointment.

The following telegram, signed by C. V. Corless, President, on behalf of the institute, has been sent to Mr. King in Ottawa:

"On behalf of the Canadian Institute of Mining and Metallurgy, I tender you sincere congratulations on your accession to the position of Premier, and express hope and confidence that Canada's greatest industry of the future, namely, mining, will be represented in the Cabinet you are now forming by the broadest minded, most capable and best-informed man to be found, one who clearly realizes that Canada's future greatness in industry rests more on her minerals than on any other natural resource.

"It is a startling and not generally realized fact that 90 per cent. of Canada contains inconceivable wealth in minerals, and that not over 15 per cent. is suitable for profitable agriculture. The ultimate permanent material sources of wealth of any country are its soil and its minerals. We hope that, in the great pressure of public affairs, these vastly important, silent, but incontrovertible facts will receive their proper weight in organizing the new Cabinet."

INCREASED EFFICIENCY IN COAL MINING.

A striking exhibition of greater labor efficiency is afforded in the English coal industry, as attested by an article in the London, Eng., "Economist." Despite the fact that many pits are closed, and that such as are operating are on short time, the average weekly production of coal for the last four weeks has been practically on a par with that of earlier in the year, when the industry was much more active. Although the number of man hours now being worked is barely 50 per cent of the normal, yet the output is only 2 per cent below what has recently been considered normal. The net effect is that the wage cost per ton of coal is barely 15 shillings per ton against 30 shillings in the first quarter of the year.

Underground Loading Devices in Metal Mines

By C. LORIMER COLBORN, (Mining Engineer, U. S. Bureau of Mines).

The diverting of men from industry to combat in the world's war focused the attention of the operators in this country upon mechanical means of doing things. The demand for man-power was so insistent that every available agency for multiplying it had to be employed. It was during the period of the war and immediately thereafter that development of the use of underground loading devices made most rapid progress. In all parts of the United States, mining engineers and mine managers were diligent in their efforts to develop mechanical loaders. The mining engineers of the U. S. Bureau of Mines in every section of the country have secured, with the co-operation of the mine operators, data on the actual performance of the mechanical shovels in their districts, and have made them available to the author of this paper.

The adaptability of a machine to a particular work depends not only upon the construction of the machine but also upon the ability of the operator to make the machine perform. Part of the data herein given may appear to reflect upon the loading device in question when the failure may be actually chargeable to lack of skill on the part of the operator. Likewise, the costs given do not represent a comparison of the machines, because no two mines are alike, and the shoveling costs are extremely variable. Thus, the hand loading costs in Mine A may be 45c. a ton, and a mechanical shovel may handle the same material for 40c. a ton. The conditions in Mine B may be such that hand shoveling can be accomplished for 25c. a ton, and mechanical shoveling for 24c. It would be unfair to state that the loader in Mine B is better than the one in Mine A because its operating cost is less.

Hunt Rotary Shovel.

The Hunt rotary shovel is made up of a cylinder, carrying four digging buckets, and a belt conveyor to take the material from the buckets to a car. The entire machine with the necessary plant and transmission parts is housed in a steel case; none of the working parts are, therefore, exposed to the dirt and moisture of the mine. It is mounted on a truck and will run on the ordinary mine track. The power is furnished by a 15 h.p. motor placed immediately below the belt conveyor. The buckets are arranged so they can swing back inside the cylinder. The operating motion to the buckets is imparted by two cams which force the buckets out of the cylinder at the proper time and retract them inside the cylinder again after the material has been discharged. The revolving cylinder with the digging buckets can be moved either to the right or left by a rack and pinion arrangement on the truck. The machine is so pivoted at the rear end of the conveyor belt that it makes it possible to deliver the material to the car irrespective of the position of the revolving cylinder. The Hunt rotary shovel is a very low, compact machine and apparently is powerful as well.

When in operation, the shovel is controlled by an operator who stands to the right of the machine near the front where he can see the digging operations. In order to shovel from a pile of broken material, the machine is run up to it and the revolving cylinder is pushed into the pile, the bottom of the cylinder almost resting on the floor. As the cylinder revolves, each bucket in its turn takes a load of material and later drops it upon the belt conveyor. Immediately after dumping this load, the bucket swings back into the cylinder. As soon as it has passed the lowest position of the cylinder, the revolving motion imparted to the bucket by the cylinder together with the protruding motion given to it by the cams pushes the bucket into the pile with a motion somewhat like that of an ordinary shovel.

As soon as the material is dumped upon the belt conveyor, it is carried up an incline and discharged into the car at the rear. The edges of the belt conveyor are concealed by a guard strip which gives a trough shape to the conveyor and prevents any of the material from falling off at the sides. By the rack and pinion arrangement described above, the revolving cylinder can be swung either to the right or to the left, which enables the machine to dig within 10 ft. to either side of the centre of the track.

The Hunt rotary shovel has been in operation at the Maryville Iron mines operated by the Steel & Tube Company of America. The management states that the machine has loaded as many as 116 cars of three-ton capacity in 8 hours. No records of the performance of this machine over a long period of time are available.

Myers-Whaley Shoveling Machine.

The Myers-Whaley shoveling machine is composed of three principal parts: the main frame, the swinging jib and the rear conveyor. The main frame is mounted on wheels running on the ordinary mine track. The machine is self-propelling and can be moved forward or backward at the will of the operator. It is driven by a 20 h.p. motor which is mounted on the main frame. The jib section and the rear conveyor are attached to the main frame near the centre of the machine by a king pin and both can be swung to the right or left. The jib section carries an automatic shovel mounted on its forward end. Behind the shovel is an armored belt which receives the material from the shovel and delivers it to a second armored belt mounted upon the rear conveyor section. The jib is pivoted on the king pin and can be swung 45° to either side. The rear conveyor section consists of an armored belt mounted on a frame which is pivoted on the king pin, allowing the rear conveyor to be swung 20° to either side.

The Myers-Whaley machine is manufactured in two sizes: No. 3 and No. 4. Number 4 is the standard size machine and weighs 18,500 lbs. The machine can be arranged for any track gauge. It can be transported on track gauge as narrow as 18-in., but while operating it is necessary to have it supported on at least 42-in. gauge track. With narrower gauges than 42 in., it is necessary to lay extra rails at the place where the machine operates, for unless this extra support is provided, the machine may tilt sufficiently to cause derailment when digging at extreme distances from the centre of the track. The overall length of the machine is 22 to 26 ft., depending upon the length of the rear conveyor, which, of course, is controlled by the length of the mine car. The width is 5 ft. 4½ in., and the height 4 ft. 9 in. In some places the height of the mine car makes it necessary to raise the rear conveyor

which, of course, raises the height of the machine. The wheel base is 42 in., width of shovel 34 in., and size of motor 20 h.p. The shovel on the jib has a reach of 10 ft. to either side of the centre of the track.

The No. 3 machine weighs 13,000 lb., and the track gauge is adaptable just as for the No. 4 machine. Length of machine is 23 ft., width 4 ft. 8 in., height 4 ft. 3 in. The shovel on the jib has a reach of 8 ft., to either side of the centre of the track. The shovel is 33 in. wide. The power is obtained from a 15 h.p. motor.

All the parts of the Myers-Whaley have been standardized. The machine has been designed for strength and the various parts are well protected, and are able to withstand heavy knocks.

The operator is seated on a platform at the right of the jib section well above the work where he can observe the action of the shovel and the belt conveyor on the jib section.

The shovel is automatic, the front part having an orbital movement, down, forward, upward, and back, which clears the material away for the next stroke. In lumpy material, this action of the shovel is augmented by moving the machine bodily forward as the shovel comes down and forward, then moving the machine partly backward in preparation for the next stroke. This bodily reciprocation of the machine is at the will of the operator. The shovel discharges its load upon the front conveyor belt, on the jib, from which it is discharged onto the rear conveyor belt, which in turn carries the load backward and delivers it to the mine car.

The Myers-Whaley shoveling machine was one of the first to be placed on the market. It has, perhaps, been given more general use and has been tried in a greater number of mines than any other machine. It has, to a certain extent, been the pioneer and borne the brunt of the criticism that is usual when new methods are urged for doing things. The experience with it has been varied.

In one mine, the Myers-Whaley has been in use for three years. The management gives the following results: During 1918, more than 30,000 tons of material was shoveled at a cost of 20.07 cents a ton. This cost was divided between repairs, 9 cents a ton, and operating labor and supplies, 11.07 cents. During 1919, nearly 39,000 tons was shoveled at a cost of 19.15 cents a ton, and during 1920, nearly 40,000 tons was shoveled at a cost of 20.69 cents per ton.

In another mine a test was observed by a Bureau of Mines engineer. The machine had one runner, two helpers, and a shoveler in attendance. A locomotive was kept constantly at hand for switching purposes. The machine readily shoveled the four and one-half tons necessary to fill the car in three minutes, after which ten minutes was taken to switch the loaded car about 500 ft. and to replace it with an empty. Over a period of two hours this machine handled cars at the rate of one car for every fifteen minutes, or eighteen tons per hour. A shift's work was about 125 tons.

In another mine, the Myers-Whaley machine was used to handle material in a slope. The machine in this mine was compelled to work on a grade of from five to ten per cent. It worked nicely on a five per cent grade and with difficulty on ten per cent. The face was ten feet high. During the period that observation was made, the machine shoveled 2,653 tons, which was at the rate of twelve tons per hour. The costs were as follows: Shoveling 20.80 cents, drilling 8.71 cents, blasting 15.39 cents, total 44.9 cents per ton. The cost of doing the same work by hand was 58.5 cents per ton.

In October, 1918, a Myers-Whaley machine was put in operation at the Priest Portal of the Hetch-Hetchy Aqueduct, Tuolaume County, California. On January 1, 1920, three machines were being used on this property, and on January 1, 1921, thirteen machines were employed. Eight of the thirteen were kept busy in the headings and five in reserve.

The outside section of tunnel was broken 11 ft. 3 in. by 11 ft. 3 in., making 126.56 cu. ft., or $10\frac{1}{4}$ tons of material for every lineal foot of tunnel. The cost of shoveling $10\frac{1}{4}$ tons was $8.08 or 79 cents per ton.

Cost of handling similar material in the South Fork heading where the entire work was done by hand was $1,278.00 for labor. The distance made was 201 feet. The size of the tunnel was the same as that of the Priest Portal. The cost was, therefore, $6.35 per lineal foot, or 60 cents per ton.

It will be noted that the cost per foot of loading out the broken rock was $1.90 greater in the Priest Portal tunnel where a mechanical loader was used, than in the South Fork where hand labor was used exclusively, but with the loader greater speed was obtained. It took the machine four hours to load the broken rock from each round in the Priest Portal heading against eight hours to do the work by hand. When the loader was working, the material could be cleaned out of the tunnel by the time the upper holes were drilled, and the drillers did not have to wait for the face to be cleaned up as in the case of hand shoveling. With greater speed, the overhead expenses are less per foot.

The Conweigh Digger belt-loader consists of a dipper mounted on the forward end of a dipper arm, a belt conveyor, an electric motor, and various accessory mechanical parts. All these parts are mounted on a truck which runs on the regular mine track. These various parts are so arranged that the dipper after digging into a pile of loose material and receiving a load, slides it upon the belt conveyor which discharges into a car in the rear.

The dipper is hinged to the dipper arm and can be swung 90° in a vertical plane on this hinge. Both the front and top of the dipper are open. The dipper arm is so constructed that it forms a trough through which the material slides from the dipper to the belt conveyor. The movement of the dipper on its hinge and the vertical motion of the dipper arm is controlled by a chain which is attached to the dipper. The discharge of the dipper is accomplished by swinging it upwards and back, so that it discharges through its top instead of swinging it horizontally and discharging through the bottom as in the usual way.

The edges of the belt conveyor are protected by a guard strip and the sides of the conveyor section are built up with wing boards. The power for the entire machine is furnished by a 15 h.p. motor.

The machine is controlled by an operator who stands on a small platform on the right of the machine, near the front, where the digging operations can be observed. The mine car is coupled to the machine in the rear. The dipper arm is lowered so that the bottom of the dipper scrapes along the floor. The machine is then moved forward which crowds the dipper into the pile. As soon as the dipper is full it is raised 90° on its hinge so that the open front of it is now at the top. The dipper arm is then raised, which allows the material to slide out of the dipper down the trough-shaped dipper arm into the pocket which feeds the belt conveyor by which it is carried to the car in the rear.

(To be continued)

Northern Ontario Letter

THE SILVER MINES.

850,000 Ounces Silver Monthly.

The concluding week of 1921 finds the silver mines of the Cobalt district producing silver at the rate of about 850,000 ounces monthly. It also finds quotations for the metal quite steady at a few points below 70 cents an ounce. This condition is expected to prevail until next spring at least, at which time a broadening in the scope of operations is probable by operations on a number of present idle properties.

Although the wage reduction in Cobalt of 15 p.c made last spring was a compromise with those in favor of a greater cut, yet the year has passed without steps being taken to place a further reduction in operation. The date upon which a further reduction is made will probably mark the turning point for the industry, in that an increase in work and output would probably follow such a step.

The Nipissing mine continues to produce silver at an exceedingly heavy rate, and will have a million ounces of the metal to its credit for the last quarter of 1921. The development of important new ore shoots has been responsible for this big increase in production, and the indications appear to be that the greatly strengthened physical conditions of the mine will reflect itself favorably upon achievements during the new year just beginning. The company has declared a dividend of 3 p.c., payable Jan. 20th. This will also be accompanied with a bonus of 3 p.c, the double disbursement amounting to $360,000. The company has a treasury surplus of upwards of four million dollars as of the end of 1921.

January Dividends.

The precious metal mines of Northern Ontario will distribute over a million dollars to their shareholders during the opening month of the new year. The gold mines alone will distribute $684,630.90, a feature being that the distributions are entirely regularly dividends and do not include any bonuses.

The Nipissing Mining Company is the only silver mining concern on the list, and this company will make a regular dividend disbursement of 3 p.c. as well as a bonus of equal amount, the combined disbursements being $360,000.

Following is a summary of the dividend-payers in January, it being noted that the last four are gold mining concerns:—

Nipissing	$360,000.00
Hollinger Consolidated	246,000.00
McIntyre-Porcupine	182,014.15
Wright-Hargreaves	137,500.00
Dome Mines	119,166.75
Total	$1,044,680.90

The Minister of Mines.

At a meeting of the Cobalt branch of the Canadian Institute of Mining and Metallurgy the following telegram was authorized, and was despatched to Hon Mackenzie King, by Arthur A. Cole, Secretary:—

"The Cobalt Branch of the Canadian Institute of Mining and Metallurgy expresses the hope that the Department of Mines will be presided over by a Minister who appreciates the important part the mining industry is destined to play in the general plan of Canada's development."

A meeting of the Cobalt Branch of the Institute was also held in connection with the proposed "Professional Engineers' Act," but no action was taken other than to invite the Secretary, Mr. Mackenzie, together with Mr. McEvoy, to visit Cobalt and explain the purpose of the bill.

Negotiating for Ruby Property.

One of the important producing companies in the Cobalt district is said to be negotiating for the old Ruby property, situated in the Township of Bucke. The property is owned by a company or syndicate comprised largely of business men in Cobalt and Haileybury.

Elk Lake and Gowganda.

Tenders are being called for putting gravel on another two-mile section of the road from Elk Lake to Gowganda. The snow roads are to be used in hauling the material, and this all points toward a still further improved motor road to that district during the coming summer.

Reports at Elk Lake tend to indicate that a power development scheme in the Fort Matachewan district may be successfully financed, and it is intimated that the Matachewan Gold Mines Company may be included in the venture.

Further details in regard to the reported find on the Sanderson claim in the Lost Lake section of the Gowganda district have been received in confirmation of the earlier reports presented in this column of the Journal. The new vein is said to be about four inches in width and is one of the more promising finds made in recent years in that district.

Drilling Results on Rochester.

Perhaps the most important information coming from the Porcupine district in connection with developments on properties outside of the producers, has to do with the diamond drill results on the Rochester property, on which the Nipissing holds an option. Various reports have been in circulation in regard to the results, and one mining paper in Northern Ontario went so far as to state that no commercial values had been encountered during the course of drilling six holes. This information was presented as being definite. However, the Journal has kept in close touch with the situation and is in a position to announce that out of the six holes drilled, only one was a blank, while No 2 and No. 5 each show high gold values across substantial widths. One 5-ft. section in hole No. 2 showed a gold content of $88.00 per ton. Hole No. 5, penetrated 15 feet, which assayed about $13 per ton. This hole was at an angle of 45 degrees and would tend to indicate a width of 7 or 8 feet of good ore. The assay result of the first 100 feet of ore in hole No. 5 was unsatisfactory, owing to the core being broken up, etc., and this led to putting down hole No. 6 to a depth of 100 to confirm first 100 feet of No. 5. At the present time, hole No. 7 is down over 200 feet and is travelling at an angle which should intersect the mineralized zone at a depth of between 500 and 600 feet. A feature of the work is that holes No. 2, 5 and 6 are so placed as to prove the continuity of the mineralized area.

Foley-O'Brien.

The Dome Mines Company is negotiating for the purchase of the Foley-O'Brien mine, and the prospects of a deal being consummated appear to be favorable. The property adjoins the Dome Extension section of the Dome Mines on the northeast and lies just outside of the town of South Porcupine. Its acquisition would give to the Dome the greatest acreage and the greatest

length of possible and probable gold ore deposition of any established gold producer in the Dominion.

Considerable work was done some years ago by the Foley-O'Brien Company, but no ore of any consequence was developed. Nevertheless, the geological structure is favorable and the intruding porphyry rocks occurring on the Dome itself are found to extend across the Dome Extension and into the Foley-O'Brien. This also holds true of the Bewick-Moreing claims lying along the south side of the Foley-O'Brien and is leading to the belief that the Dome may also have in mind the purchase of this part of the Bewick-Moreing holdings, now controlled by the Goldale Mining Company.

Porcupine Paymaster.

The Journal representative made a special visit to the property of the Porcupine Paymaster for the purpose of seeing the quartz porphyry body in which commercial gold values are said to occur. The body is about 98 feet in width and contains evenly distributed iron pyrites with which the gold content is said to be associated. Officials declare the body contains an average of $5.00 per ton in gold. Arrangements have been made to continue the shaft from the 200-ft. level to a depth of 400 feet, and this work is now under way.

Davidson.

Operations have been suspended on the Davidson property owing to difficulty to make arrangements for hydro-electric power. The company has no contract with the power company. Between now and next spring diamond drilling will be carried on from the surface.

Schumacher.

No definite developments are reported this week in connection with the pending deal for the Schumacher mine. It has been learned officially that two offers for control have been made, but none has been accepted up until a few days ago.

Lake Shore.

Excellent results are being met with at the 600-ft. level of the Lake Shore mine where the size and richness of vein No. 2 greatly exceeds even the favorable conditions at the 400-ft. level. During November, production exceeded $54,000, thereby setting the highest record so far in the history of the mine.

Wright-Hargreaves.

The Wright-Hargreaves is now treating an average of over 170 tons of ore daily and is yielding close to $13.00 per ton. It is believed the present mill may in due course be brought up to an average of approximately 200 tons daily.

Tough-Oakes.

In a cross-cut on the Tough-Oakes at a point about 200 feet or so east of the boundary of the Sylvanite mine, two important veins have been encountered. They are believed to lie in the main "break" and the ore is exceptionally rich over a good stoping width. Between the boundary and the fault is an area about 400 feet in length in which the Tough-Oakes has every indication of developing a large volume of high grade ore.

Sylvanite.

The shaft on the Sylvanite is down 200 feet and will be continued to a depth of about 400 feet. Levels will be established at intervals of every 130 feet. The shaft is in the main "break" in which the producing mines of the district get their ore. The Sylvanite has about 1,500 feet in length of this zone.

The Light Railway.

All Kirkland Lake is aroused against the methods being employed by the Northern Light Railway Construction Company in preliminary work on the project. Men are alleged to have been employed, but have gone without pay. Individuals as well as the board of trade have or are lodging complaints with Toronto authorities.

Argonaut Gold.

Prospects of securing money with which to finance the construction of a mill on the Argonaut Gold are promising. The property contains considerable ore of good grade.

British Columbia Letter

Portland Canal District.

Stewart, B. C.—Much more capital is to be invested in the Portland Canal District of British Columbia and there will be developed there more than one Premier Mine. Such is the opinion of Dr. R. E. McKechnie, of Vancouver, B.C., who is interested in a number of properties in the Marmot River section of the northwest coast. Referring to the group of claims in which he is chiefly concerned Dr. McKechnie, who spent a considerable part of last summer on the ground, said that there were many rich but small veins with surface exposures and that the whole region seemed to be mineralized. The point, of course, was to find the main leads, to develop them, and then to interest men able to put up the capital required to make a producing mine. That was the policy he and his associates were pursuing and he had every confidence that the Portland Canal zone would be responsible for just as notable a mining boom as were the Slocan and other boundary sections of the Province some years ago.

The Premier Mine.

The aerial tramway to the Premier Mine has been completed and shortly will be in operation. There still is a little work to be done on the bunkers at the dock. The tramway is eleven and one half miles long, contains 46 miles of cable on which there are 125 buckets with a capacity of 7 cubic feet each. The traveling speed is six miles an hour. Ten tons of ore per hour can be handled over the line. Three telephone lines have been strung along the route, two for operation purposes and the other for the use of the company. Three men will be employed walking over the line continuously and the power necessary will be generated at the mine from which point, of course, the whole installation will be controlled. The bunkers have a capacity of 1,500 tons. The bunker itself is about the centre of a three storey building, 210 feet long by 36 feet in width, and containing some 100,000 feet of lumber. The top floor is taken up by the tram terminal which runs into it a distance of 150 feet. Trap doors have been let into the floor, through which the ore will be dumped from the buckets to the bunker. On this floor ahead of the terminal rails is a large space to be used for incoming freight and in front of this again there are two sleeping rooms and a large office. An incline elevator will be operated by a 10 h.p. Fairbanks Morse Gasolene Engine which also is installed on this floor. The elevator is so constructed as to permit the delivery of freight from the dock to each of the floors

of the building. The second floor is confined to the bunker itself and makes provision also for considerable warehouse space. The first, or ground floor, is devoted to the conveyor belt, on either side of which is space for the storing of 1,000 tons of concentrates. A 20 h.p. Fairbanks Morse Gasolene Engine operates the conveyor belt, which runs the full length of the building from behind the bunkers. The transfer of ore across the dock is provided for by another belt which lifts when not in use. A Delco Plant has been installed for lighting purposes, capable of carrying at least 100 average size lamps. The work has been done by Riblet Brothers, of Spokane, Wn., under the superintendence of L. H. Graham.

Alice Arm.

Alice Arm.—A lower tunnel is being driven on the Esperanza Mine property. Already it is in 110 feet and ore is expected to be encountered at 135 feet. It then is the intention to open up a raise in order to connect with the upper drift. Work is being continued during the winter. The residents of Alice Arm are signing a petition to the Government asking that other companies be permitted to operate the Alice Arm—Dolly Varden railway next year in the event of its being left inactive by the Taylor Engineering Company. The explanation is that lack of transportation this year has seriously handicapped the development work on many properties of the upper Kitsault Valley.

Eastern B. C. Mining Association.

At the organization meeting of the Eastern British Columbia Mining Association, held recently at Nelson, B.C., it was explained that the objects were to protect the industry from ill advised legislation and generally to do anything that will stimulate interest and educate legislators in the problems and needs of the industry. Officers were elected as follows: President, R. Randolph Bruce, Windermere; vice-president, J. P. MacFadden, New Denver; secretary-treasurer, W. H. Burgess, Kaslo. Executive, W. A. Cameron, New Denver; James Anderson, Kaslo; E. G. Montgomery, Kimberley; W. T. McDowell, Ymir; Douglas Lay, Rossland; E. E. Fowler, Riondel; L. H. Biggar, Slocam City, Clarence Cunningham, Alamo; T. W. Bingay, Trail; S. G. Blaylock, Trail; and J. H. Turner, Nelson. Reports were submitted as to the results of the representations made to the Provincial Government with reference to mining taxation and it was considered that the concessions obtained already had justified the existence of the Association. A resolution was carried asking Hon. Lyon Mackenzie King, who will be the next Premier of Canada, to appoint R. E. Beattie, member elect for East Kootenay, Minister of Mines in his Cabinet. It was put on record that Mr. Beattie represents a rich mineral district, that he has been engaged in mining operations, and that he has the confidence of the operators of British Columbia. The intention is that the Association shall meet from time to time in the different mining centres of the Province.

Bullock Mines.

R. H. Graves, managing director of the Bullock Gold Mines Ltd., operating at Poplar in the Lardeau Valley, reports completion of the installation of a Ross gold mill and crusher at the mine. Crushing operations have commenced. The ore of this mine is of a peculiar character. Although containing free gold, it carries an extraordinary assortment of other minerals. A single sample taken from the shaft in sinking revealed, on assay, platinum, gold, copper, silver, lead, cinnabar and galium. An extraction of $30 a ton in gold is looked for from the ore waiting treatment and the question of saving values in other minerals, previous and base, is under investigation by Dr. Ben F. Koerning, of Salt Lake City. On the Bullock a crosscut has been driven south 400 feet to cut the arsenical dyke. At 300 feet depth the face is in ore showing coarse free gold. A vertical shaft sunk thirty feet through white quartz, carrying the variety of minerals enumerated, connects with a thirty foot raise. In all nine distinct veins are being worked and a considerable tonnage of first class ore has been blocked out for stoping.

Lead Market Improved.

Trail, B.C.—Messrs. Grant Hall and D. C. Coleman, vice-president and second vice-president, respectively, of the Canadian Pacific Railway Company, visited Trail recently and inspected the smelter and refineries of the Canadian Consolidated Mining & Smelting Co. Ore receipts at the Trail Smelter of the Canadian Consolidated for the week ending December 7th, totalled 8,707 tons. For the week from the 8th to the 14th the total was 9,080 tons. The latter was the heaviest week's receipts of the year, bringing the aggregate for 1921 up to date to 389,896 tons. Recent independent shippers include the Horn Silver, Similkameen; Knob Hill, Republic, Mohawk, Kaslo; Rosebery-Surprise, New Denver; and the Utica, Kaslo. The Canadian Consolidated Company has issued the following self-explantory notice to custom lead contributors: "When we issued Schedule "D" lead ore rates we expressed the hope that lead marketing conditions would improve so that we could reduce the time of payment. We are pleased to be able to announce that our surplus stock is reducing so satisfactorily that beginning with January 1, 1922, we shall make payments as soon as possible after sampling; in other words, pay spot cash. (In recent weeks payment has been made by 90 day notes). We are therefore amending the settlement clause in Schedule "D" to read as follows: 'Settlement: Payment will be made in full shortly after sampling to such shippers as select the spot settlement basis for lead. An advance payment will be made to those selecting the pooling scheme on the same basis as if they had selected the spot lead quotation, but less 25 per cent of the net value of the lead. In this case there will be an adjustment when the lead value is finally ascertained in the operation of the pool. All ore received in December, after this date, will be paid for in full in 30 days from the date of arrival."

Will Rebuild Concentrator.

Vancouver, B.C.—Tenders have been received for the rebuilding of the concentrator of the Britannia Copper Mines at Britannia Beach. It is expected to cost about $500,000. The reconstruction of the plant in its entirety will run well over a million dollars. Orders for considerable machinery, it is understood, have been placed at Allentown Pa. The rebuilding of the destroyed residential section is to be commenced immediately on a higher site.

BELITTLING CANADIAN EFFORT.

By ALEXANDER GRAY.

New York journals should be more circumspect when they scornfully allude to the mining development in the Canadian northwest in this strain:

"Promoters are endeavoring to solicit sufficient British capital to develop these (Le Pas) mines, instancing the case of Cobalt, where, out of the enormously valuable properties which were developed after the first rush some years ago, 26 were financed by American capital, 2 by English capital, and only 1 by Canadian capital."

Verily "we live to learn." Canadians cannot complain of this strange conceit—so long as the clientelles

of those journals think they did it. An impression has prevailed hereabouts — and it still prevails — that central Cobalt mines really financed themselves. Temiskaming & Hudson's Bay scrambled what loose change there was in a few bush towns. Trethewey got enough out of its initial shipments to clear the trail toward a castle in Merrie England, go yachting in his own pleasure craft- and take an occasional flyer in other mining ventures. Messrs. Leonard and Longwell did not have to enlist outside capital; for the Conigias began at the grass roots to make a noise like millions. La Rose owners brought their properties to a producing stage where New York and Toronto capitalists in combination created La Rose Consolidated. O'Brien ownership was a duet—and now is the personal possession of the Senator whose name it bears. Crown Reserve made an emergency shipment of high grade—and then started on its extraordinary career—but it is admissible that American smelters paid cash for the company's bullion—and did not lose anything in the transactions. Cobalt Lake had Canadian parentage.

Had it been contended by American financial journals that Canadian capitalists of large affairs did not participate in Cobalt until Cobalt had made enough millionaires to take care of itself, there would have been more truth in the recent comment regarding Le Pas requirements.

Kerr Lake was a joint account affair—eventually becoming almost wholly American. Nipissing—greatest of all—is a standard of excellence—for which service E. P. Earle and R. B. Watson are entitled to honorary membership in the Royal Canadian Society. Buffalo certainly did not drain any bank balances when Charles L. Denison bought it. Temiskaming and Beaver were of international origin.

But why dwell upon the self-adulatory over-the-border writers! Marketwise, undoubtedly Americans mopped up a great deal of money. American engineers aided Canadians in acquiring millions—and are continuing their efforts to make those millions reproductive.

THE "NEW TRAIL" AND THE BETTER TRAIL.

Montreal is being surfeited with page advertisements depicting the "New Trail" mining proposition. Shares at a dime a-piece that could not be had for less than 15 cents after a specified date have been offered. All the evidence indicates that the promoters are duplicating the performances of the "Pan Extension" coterie. The public—gullible public—having a short memory, a house-to-house canvass was instituted—and the general inference conveyed is that the "New Trail" is part and parcel of a district that has disclosed the Flin Flon, Mandy, the Elbow Lake prospects and other things with possibilities.

The fact of the matter is: "New Trail" is in the taradiddled class, and is a fairly long hike away from whatever has aroused the interest of mining scientists and capitalists. All the dimes collected—and all the display to which reputable newspapers have lent themselves—may befool subscribers but it will take more than map-making to associate this ten-for-a-dollar venture with the Murray properties, the areas acquired by McCuaig interests, the Flin Flon, or the Mandy. It would be more appropriate and more truthful to have dubbed the "New Trail" the Extension of the Pan Extension, in which the fish hooked are on the bank gasping.

And yet the episode was not unexpected when certain of the Hollinger directorate took an option on the Elbow Lake claims upon which the Murray Brothers made a discovery deserving of the qualified commendation of Commissioner Wallace and the consideration of a Hollinger engineer. Whether the surface indications and gold showings will conform to the law of averages is what those who are investigating them will determine forthwith. If there are enough streaks of fat to make palatable the lean, those Elbow Lake areas will have the working capital needed for their exploration and development. About all that is to be said of them until they are trenched and closely scrutinized is that they look better than Rice and Herb Lake prospects, which have been on exhibition for nearly ten years.

New Trails are laborious at best. When far removed, as these are, they are unadapted to tenderfeet. They cannot be carpeted with 10-cent script, nor made less difficult if the price be raised to 15 cents a share. For this reason the Manitoba areas have been fortunate in attracting discriminating mining capital. Tonapah people made the Mandy, despite its transportation handicaps. Hayden-Stone, W. B. Thompson and the Mining Corporation of Canada dealt with and are dealing with the Flin Flon. Now Hollinger engineers are giving the Murray Elbow Lake ground the third degree, and there is a feeling that the enrichments at outcrop may serve to provide a paying average in a large mineralized zone. Structural irregularities at Elbow Lake, notwithstanding the distribution of gold wherever there is quart, exact the most thorough prospecting.—A. G.

SMALL PLANTS FOR TREATING GOLD ORES.

By F. A. McRAE.

There has been considerable interesting discussion during the past year regarding small individual plants for small gold mines. Various opinions have been expressed and one point generally conceded is that while the larger properties are in a position to instal the big standard equipment, yet there are numerous properties with good gold ore resources but in only limited quantity.

The problem has been to find a plant small enough yet having all the modern appliances, including the use of cyanide. There are various instances where attempts have been made to recover gold by amalgamation and concentration, but the Province of Ontario has yet to record a single success in this method.

On such properties as the Bourke's Gold Mines, the Croesus Gold Mines and the Murray-Mogridge, there are limited quantities of gold ore in sight, but not in sufficient volume to return a profit after covering the heavy expense of installing a mill with big standard equipment. Further development may add to the amount of ore in sight, but the fact is that as such mines now stand they could be operated successfully were they equipped with small milling plants of modern design.

Through Bolton, Hurd & Co., of Philadelphia, I have received some interesting information on the subject of small mills. This firm is interested in mining in the Kirkland Lake field, and like many other mining interests have been searching for a solution of the difficulties of successfully operating the smaller deposits of ore which lie throughout Northern Ontario. Inquiry was made in New Zealand, and, in reply to a letter to the Minister of Mines of that country, the following information was offered:

A New Zealand Cyanide Plant.

I have pleasure in supplying the following information regarding a Cyanide Plant of 10 ton capacity as

used by miners in New Zealand. I have to point out, however, that the detail cost of machinery is very difficult to supply and costs are uncertain as they depend on the supply of second-hand material.

The actual details of the process would depend on the class of ore, but in general the Flow sheet shown could be adapted to most varieties.

The treatment would involve—

Rock breaking to 1½ inches.
Stamping through a 20 or 30 mesh.
Amalgamation of free gold or copper plates.
Concentration on Wilfley table.
Separation of sands and slimes.
Dewatering the slimes.
Percolation treatment of sands.
Precipitation of bullion by zinc.

,The output of the stamps should be about 3tons per stamp, per 24 hours, so that if one shift only is worked, 10 head would be reuired; if two shifts, then 5head would be sufficient.

Should the sands not be amenable to cyanide treatment, two grinding pans would be necessary to fine-grind these sands.

The plant could be obtained for about £4,440 as at the present time there is a good deal of milling plant lying idle.

The plant could be put up at this figure, only by buying the units in the cheapest market and by choosing a battery site that would not require a great deal of preparation.

An alternative plant which would be suitable for a small mine, but would cost a little more in treatment charges, per ton, could be designed and constructed more cheaply. In this case, the ore, after leaving the Wilfrey would be discharged into one of the settling pits. These mixed sands and slimes would then be cyanided in 30 ft. vats.

By getting a thorough mixture of sands and slimes there would, with most classes of ore, be no difficulty in percolation treatment.

The rock breaker might also be omitted and the ore hand-spalled. The cost could be further reduced by leaving out the housing for the cyanide plant. The approximate cost is £2,690.

AEROPLANES AND PROSPECTING.

According to the latest report of the Air Board the aeroplane may assist the prospector in a way that was not contemplated by those who advocated its use in pioneer work, namely in battling the mosquito. The report gives details of reconnaissance work carried out in the mosquito-breeding areas in the Lower Fraser Valley, B.C., with the result that the Entomological Branch of the Department of Agriculture has been enabled to recommend means for the control of the pests, which have been so bad at times as to kill off cattle, impair fruit picking, and even oblige entire lumber camps to close down.

For years there had been a demand for an investigation into the breeding places of this pest, and this was commenced over an area embracing 2,000 square miles, resulting in the discovery that the nuisance had its origin in the low-lying areas of the Fraser River subject at times to flooding of high freshet. These breeding areas were often many thousands acres in extent, and expeditions to locate and define them, which have been carried out by auto, boat and on foot during the last two years, found it impossible to obtain sufficient data over such an extensive territory, and the value of air surveys presented itself.

The result is that, with aerial observations and photographs, combined with the entomologist's skill, the little terrorists of the air will play a minor role in another act of "the survival of the fittest."

Combatting mosquitoes was not the only activity of the Air Board during the summer. Nine departments of the Dominion Government called the service of aerial operations to their aid.

Outstanding among the exploits of the year was the assistance rendered by aeroplanes from the High River Air Station in connection with the great 12 days' forest fire in the Crow's Nest Reserve, Alberta, last August, the demonstration flight of 1,000 miles around Lake Winnipeg, and the operations in connection with reclamation service in the flooded areas of northern Manitoba.

The Air Board's mobile unit in Northern Ontario demonstrated another of the useful purposes served by aircraft in the seaplane flight made for the Mines Department of the Provincial Government to assist in the geological examination of that district. Prof. E. L. Bruce of the Department of Mineralogy, Queen's University, took part in this flight, which enabled him to make valuable observations, adding to previous geological knowledge of the district around Lake St. Joseph. The time and labor which can be saved by the use of the seaplane in a general survey of such areas, making it possible for the geologist to devote more time to examinations of more promising fields, was emphasized by Prof. Bruce in his report.

The photographic reconnaissance of international boundary waters, which included operations on the St. Lawrence River and the canal system between Montreal and Brockville, the Waterton Lakes in southern Alberta, the Welland Canal, and St. Croix River, N.B., were also important parts of the Air Board's activities.

This modern development of national life, whose operations range from the fighting of mosquitoes to the study of great glacial formations, has had a good year in the training of officers and airmen for the further extension of its usefulness.

THE OLD CARIBOO.

A writer quoted in Financial Post says:

"The completion of the Pacific Great Eastern Railway to Quesnel last August, brings railway transportation to within sixty miles of Barkerville and puts an altogether new aspect on the future of our mining. Hitherto, the main draw-back to outside capital has been the excessive cost of freight and its time in transit. Also, it took four days each way by horse stage for passengers, and this meant a good deal to men whose time was valuable. Freight from Vancouver, by way of Ashcroft on the C. P. R. was rarely less than four and often eight weeks on the way. Now it can be delivered in about three days and a traveler can make it in half a day from the railway. This means that more prospective investors will visit us, especially so since the elusive and ever-attractive metal is in more demand than ever. It also means that a number of known deposits—both in gravel and ore — that hitherto cost over $20 to produce an ounce of gold, can be worked at a profit.

"A number of the larger valleys, well within the limits of the zone, are unknown quantities to-day. Paying creeks, in some instances very rich ones, dump into them. Numerous primitive attempts have been made by individuals or groups of miners, but always with the same results—too deep, driven out by water. Modern drilling machines could test these old leads with certainty and accuracy both as to depth and values for either dredging or drifting purposes. The existence of

The Canadian Miners' Buying Directory.

Acetylene Gas:
Canada Carbide Company, Ltd
Prest-O-Lite Co. of Canada, Ltd.

Acetylene Welding:
The Toronto Iron Works, Ltd.

A.C. Units:
Powley & Townsley, Limited.

Agitators:
The Dorr Co.
Can. Chicago Bridge & Iron Co., Ltd.
Horton Steel Works, Limited.

Air Compressors:
Belliss & Morcom, Ltd.
Laurie & Lamb

Air Hoists:
Canadian Ingersoll-Rand Co., Ltd
Mussens, Limited.

Air Receivers:
The Toronto Iron Works, Ltd.

Alloy and Carbon Tool Steel:
Peacock Brothers Limited.

Alternators:
MacGovern & Co.

Aluminium:
Spielman Agencies, Regd

Amalgamators:
Northern Canada Supply Co.
Mine and Smelter Supply Co
Wabi Iron Works.

Antimony:
Canada Metal Co.

Antimonial Lead:
Pennsylvania Smelting Co

Assayers' and Chemists' Supplies:
Dominion Engineering & Inspection Co.
Lymans, Limited
Mine & Smelter Supply Co.
Pennsylvania Smelting Co.
Stanley, W. F. & Co., Ltd.

Ash Conveyors:
Canadian Link-Belt Company

Ashes Handling Machinery:
Canadian Link-Belt Co., Ltd

Assayers and Chemists:
Milton L. Hersey Co., Ltd
Campbell & Deyell
Ledoux & Co.
Thos. Heys & Son
C. L. Constant Co.

Asbestos:
Everitt & Co

Balls:
Hull Iron & Steel Foundries, Ltd
Peacock Brothers Limited.
The Wabi Iron Works.
The Hardinge Conical Mill Co
The William Kennedy & Sons, Ltd.

Ball Mills:
Hardinge Conical Mill Co.
Hull Iron & Steel Foundries, Ltd
The Wabi Iron Works.
The William Kennedy & Sons, Ltd.

Babbit Metals:
Canada Metal Co.
Hoyt Metal Co.

Ball Mill Feeders:
Hardinge Conical Mill Co
Hull Iron & Steel Foundries, Ltd

Ball Mill Linings:
Hardinge Conical Mill Co
The William Kennedy & Sons, Ltd.
Peacock Brothers, Limited
Hull Iron & Steel Foundries, Ltd

Belting—Leather, Rubber and Cotton:
Canadian Link-Belt Co., Ltd.
The Mine & Smelter Supply Co
Northern Canada Supply Co.
Jones & Glasco.

Belting:
R. T. Gilman & Co
Gutta Percha & Rubber, Ltd

Belting—Silent Chain:
Canadian Link-Belt Co., Ltd.
Hans Renold of Canada, Limited, Montreal
Jones & Glassco (Regd.)

Belting (Transmission):
Goodyear Tire & Rubber Co

Belting (Elevator):
Goodyear Tire & Rubber Co

Belting (Conveyor):
Goodyear Tire & Rubber Co
Gutta Percha & Rubber, Ltd.

Bins and Hoppers:
The Toronto Iron Works, Ltd.
Can. Chicago Bridge & Iron Co., Ltd.
Horton Steel Works, Limited.

Blasting Batteries and Supplies:
Canadian Ingersoll-Rand Co., Ltd
Mussens, Ltd.
Canadian Explosives, Ltd.
Powley & Townsley, Limited.

Bluestone:
The Consolidated Mining & Smelting Co
The Coniagas Reduction Co., Ltd.

Blowers:
Canadian Fairbanks-Morse Co., Ltd
Northern Canada Supply Co.

Boilers:
Canadian Ingersoll-Rand Co., Ltd
Marsh Engineering Works
R. T. Gilman & Co.
The John Inglis Company
Wabi Iron Works.

Blue Vitriol (Coniagas Red):
Canadian Fairbanks-Morse Co., Ltd.

Bortz and Carbons:
Diamond Drill Carbon Co.

Boxes, Cable Junction:
Standard Underground Cable Co. of Canada, Ltd.
Northern Electric Co., Ltd.

Brazilian Rough Diamonds:
Diamond Drill Carbon Co.

Brazilian Mica:
Diamond Drill Carbon Co.

Buggies, Mine Car (Steel)
Hendrick Manufacturing Co.

Brazilian Ballas:
Diamond Drill Carbon Co.

Brazilian Rock Crystal:
Diamond Drill Carbon Co.

Brazilian Tourmalines:
Diamond Drill Carbon Co

Brazilian Aquamarines:
Diamond Drill Carbon Co.

Bridges—Man Trolley and Rope Operated—Material Handling:
Canadian Mead-Morrison Co., Limited

Bronze, Manganese, Perforated and Plain:
Hendrick Manufacturing Co.

Buckets:
Canadian Ingersoll-Rand Co., Ltd.
R. T. Gilman & Co.
Hendrick Manufacturing Co
Canadian Link-Belt Co., Ltd.
Marsh Engineering Works
Mussens, Ltd.
MacKinnon Steel Co., Ltd.
Northern Canada Supply Co.
The Wabi Iron Works

Buckets, Elevator:
Canadian Link-Belt Co., Ltd.
Hendrick Mfg. Co.
Peacock Brothers Limited.

Cable—Aerial and Underground:
Canada Wire & Cable Co.
Northern Canada Supply Co
Standard Underground Cable Co of Canada, Ltd
Peacock Brothers, Limited

Cableways:
Canadian Mead-Morrison Co., Limited
Fraser & Chalmers of Canada, Ltd
Mussens, Ltd.
The Wabi Iron Works
R. T. Gilman & Co

Cages:
Canadian Ingersoll-Rand Co., Ltd., Montreal, Que.
Northern Canada Supply Co.
Fraser & Chalmers of Canada, Ltd
The Electric Steel & Metals Co.
The Mine & Smelter Supply Co.
Mussens, Ltd.
The Wabi Iron Works

these unprospected, but ideally situated, channels is one of the reasons why so many mining men are of the opinion that a much larger amount of Cariboo's original gold than has been taken out is still waiting for a chance to hit the sluice rifles and help relieve the present stringency. One such valley, within ten miles of Barkerville, has, dumping into it, four side creeks at intervals of from one to three miles apart which between them, produced within recent years close to a million dollars in dust. They are only small streams and the valley into which they empty is over 1,000 feet wide; yet absolutely nothing is known about this immense body of gravel other than that it carries more or less gold as far as it has been penetrated by shallow holes."

The writer goes on to tell that the large streams contain big possibilities for dredging, and that on the Cottonwood River, not far away, preparations are being made for the installation of a modern California dredge.

VISITING GEOLOGISTS.

Among those who are attending the Toronto meeting of the American Association for the Advancement of Sciences are two college deans who some years ago were employed in Northern Ontario by the Bureau of Mines. They are geologists who follow with interest the development of the north country, in which they did pioneer work some years ago.

Dr. E. S. Moore, who was born at Clarksburg, graduated from the University of Toronto in 1904, taking his M.A. in 1907, and a Ph.D. degree at the University of Chicago in 1909. Dr. Moore was Professor of Geology and Mineralogy at the Pennsylvania State College from 1909 to 1917, and is at present Dean of the School of Mines there, a position which he has held since 1917. Besides teaching, Dr. Moore has had considerable practical work, having been geologist with the Ontario Bureau of Mines from 1904 to 1910; geologist on the Canadian Geological Survey, 1912; on the Sir William McKenzie expedition to Hudson Bay in 1916; for the Texas Oil Co., in Cuba, 1917; on the Pennsylvania State Survey and the United States Geological Survey. He attended the British Association for the Advancement of Science in Australia in 1914.

Dr. Moore is Secretary of Section E (geology and geography) of the American Association for the Advancement of Science.

Dr. Geo. F. Kay was born at Virginia, Ontario, and graduated from the University of Toronto in 1900. He took his M.A. in 1902, and then went to the University of Chicago, where he was a fellow, and was awarded his doctor's degree in 1914. While a student in Toronto he was engaged in work for the Ontario Department of Mines. He was later geologist for the Lake Superior Power Co. Since then he has shown his ability in work for the U. S. Geological Survey and other organizations in the United States, studying, among other things, the coal deposits in the Bering field, Alaska, and in Iowa and Southwest Oregon. Dr. Kay is now Dean of the College of Liberal Arts at the University of Iowa, having been Professor of Geology from 1907 to 1911, and head of the Department of Geology from then until 1917.

LAKE SHORE.

Although the Lake Shore mill operated only 92.36 per cent. of the possible running time, yet the output of gold for November amounted to $54,343.51, thereby exceeding any former record. The mill treated a total of 1,810 tons of ore, the production being at an average rate of $30.02 per ton. Therefore, both in regard to total output for the month as well as the richness of the ore, the Lake Shore established new records.

This achievement was made possible by the development of bonanza ore at the 600-ft. level, where considerable material coming from development work has been found to contain upwards of $100 per ton. A feature of the work is that each ton of high-grade ore taken out during the course of development work is adding to the ore reserves at the rate of several tons, and is resulting in the Lake Shore looming up as a much larger mine than has generally been supposed.

THE B. C. COAL OUTPUT FOR THE MONTH OF NOVEMBER, 1921.

Vancouver Island.

Mine	Tons.	
Canadian Western Fuel Co., Nanaimo	47,758	
Canadian Collieries (D) Ltd.		
Comox	27,291	
South Wellington	8,703	
Extension	14,630	
Nanoose Wellington Collieries, Wellington	6,560	
Granby Consolidated M. S. & P. Co., Cassidy	22,663	
Old Wellington (King & Foster)	371	
Total	127,976	127,976

Nicola-Princeton District.

Middlesboro Collieries, Middlesboro	4,991	
Fleming Coal Co., Merritt	2,210	
Coalmont Collieries, Coalmont	10,146	
Princeton Coal & Land Co., Princeton	2,470	
Total	19.7	19,817

Crow's Nest Pass District.

Crow's Nest Pass Coal Co.		
Coal Creek	45,102	
Michel	31,703	
Corbin Coal & Coke Co.		
Corbin	10,202	
Total	87,007	87,007
		234,800

CANADA
DEPARTMENT OF MINES

HON. SIR JAMES LOUGHEED, *Minister* CHARLES CAMSELL, *Deputy Minister*

MINES BRANCH

Recent Publications

Phosphate in Canada, by H. S. Spence.

Smelter Treatment Rates, Trail, B. C.

Road Materials along the the Lawrence River, from Quebec Boundary to Cardinal, Ont., by R. H. Picher.

Building and Ornamental Stones of Canada (British Columbia). Vol. V., by W. A. Parks, Ph.D.

Annual Mineral Production Reports, by J. McLeish, B.A.

The Coal-fields and Coal Industry of Eastern Canada, by F. W. Gray.

The Value of Peat Fuel for the Generation of Steam, by J. Blizard, B.Sc.

Analyses of Canadian Fuels. Parts I to V, by E. Stansfield, M.Sc., and J. H. H. Nicolls, M.Sc.

Graphite, by H. S. Spence.

Summary Report of the Mines Branch, 1919.

The Helium Sources of the British Empire, by D. J. McLennan and others.

The Mines Branch maintains the following laboratories in which investigations are made with a view to assisting in the development of the general mining industries of Canada:—

Fuel Testing Laboratory.—Testing value of Canadian fuels for steam raising and production of power gas; analyses, and other chemical and physical examinations of solid, liquid and gaseous fuels are also made.

Ore-Dressing Laboratory.—Testing of Canadian ores and minerals, to ascertain most economical methods of treatment.

Chemical Laboratory.—Analysing and assaying of all mineral substances and their manufactured products. Copies of schedules of fees, which are slightly in excess of those charged by private practitioners, may be had on application.

Ceramic Laboratory.—Equipment is such that complete physical tests on clays and shale of the Dominion can be made, to determine their value from an economic standpoint.

Structural Materials Laboratory.—Experimental work on sands, cements and limes is also undertaken.

Applications for reports and particulars relative to having investigations made in the several laboratories should be addressed to The Director, Mines Branch, Department of Mines, Ottawa.

GEOLOGICAL SURVEY

Recent Publications

Summary Report. The annual Summary Report of the Geological Survey is now printed in parts. Applicants should therefore, state what particular geologist's report is required, or what subjects they are interested in

Memoir 108. The Mackenzie River basin, by Charles Camsell and Wyatt Malcolm.

Memoir 111. The Silurian geology and faunas of Ontario peninsula and Manitoulin and adjacent islands, by M. Y. Williams.

Memoir 113. Geology and mineral deposits on a part of Amherst township, Quebec, by M. E. Wilson.

Memoir 114. Road material surveys in the city and district of Montreal, Quebec, by Henri Gauthier.

Memoir 115. Geology of Matachewan district, Northern Ontario, by H. C. Cooke.

Memoir 116. Investigations in the gas and oil fields of Alberta, Saskatchewan and Manitoba, by D. B. Dowling, S. E. Slipper and F. H. McLearn.

Memoir 119. The Reed-Wekusko Map-Area Northern Manitoba, by F. J. Alcock.

Memoir 121. The Malagash Salt Deposit, Cumberland County, N. S., by A. O. L. Hayes.

Memoir 123. Sixtymile and Ladue Rivers Area, Yukon, by W. E. Cockfield.

Map 164A. St. John, New Brunswick. Topography.

Map 185A. Sandon (Slocan and Ainsworth Mining Divisions). Topography.

Map 1584. Blairmore, Alberta. Geology.

Map 1691. Buckingham, Hull and Labelle counties, Quebec. Geology.

Map 1705. Thetford-Black Lake area, Quebec. Topography.

Map 1707. New Glasgow, Pictou county, N.S. Topography.

Map 1742. Ainsworth, Kootenay district, B.C. Geology.

Map 1751. Wainwright, Alberta. Topography.

Map 1752. Monitor, Alberta and Saskatchewan. Topography.

Map 1754. Upper Elk and Upper Highwood rivers, British Columbia and Alberta. Topography.

Map 1766. Explored Routes in a belt traversed by the Canadian National Railways between Penhurst and Longlac, Algoma and Thunder Bay districts, Ontario. Geology.

Map 1795. Portions of Maniwaki, Kensington, Egan and Aumond townships, Hull county, Quebec. Geology.

Map 1801. Reed and Wekusko Lakes region, Manitoba. Geology.

Applicants for publications not listed above should mention the precise area concerning which information is desired.

The Geological Survey will, under certain limitations, give information and advice upon subjects relating to general and economic geology. Mineral and rock specimens, when accompanied by definite statements of localities, will be examined and their nature reported upon.

Communications should be addressed to The Director, Geological Survey, Ottawa.

Ontario's Minerals

PROVINCE OF ONTARIO

DEPARTMENT OF MINES.

HON. H. MILLS, Minister of Mines.

Mineral Areas.

Ontario, with its 407,262 square miles, contains many millions of acres in which the geological formations are favorable for the occurrence of minerals, 70 per cent of the area being underlain by rocks of pre-Cambrian age. The phenomenally rich silver mines of Cobalt occur in these rocks; so also do the far-famed nickel-copper deposits of Sudbury, the gold of Porcupine and Kirkland Lake, and the iron ore of Magpie and Moose Mountain mines.

Economic Minerals.

In addition to the above, practically all economic minerals (coal and tin excepted) are found in Ontario:—actinolite, apatite, arsenic, asbestos, cobalt, corundum, feldspar, fluorspar, graphite, gypsum, iron pyrites, lead, mica, molybdenite, natural gas, palladium, petroleum, platinum, quartz, salt, talc and zinc. This Province has the largest deposits on the continent of talc, feldspar, mica and graphite.

Building materials, such as ornamental marble, limestone, sandstone, granite, trap, sand and gravel, lime, portland cement, brick and tile, meet every demand.

Mineral Production.

Ontario in 1920 produced 36 per cent. of the total mineral output of Canada. Preliminary returns show the output of the mines and metallurgical works of the Province for the year 1920 to be worth $68,456,781, of which the metallic production was $46,228,827.

The following figures show the rapid growth of Ontario's mineral industry by five-year periods since 1891:

Year.	Value.	Year.	Value.
1891	$4,705,672	1906	$22,388,383
1896	5,235,003	1911	41,976,797
1901	11,831,086	1916	65,303,822

Dividends.

Dividends and bonuses paid to the end of 1920 amounted to $18,802,166 for gold mining companies, and $82,403,185 for silver mining companies, or a total of $101,205,351.

Mining Regulations.

A miner's license costs $5.00 per annum, and entitles the holder to stake out in any or every mining division three claims of 40 acres each. After performing 200 days' assessment work on a claim, patent may be obtained from the Crown on payment of $2.50 or $3.00 per acre, depending on location in unsurveyed or surveyed territory.

Assay Office.

The Provincial Assay Office at No. 5 Queen's Park, Toronto, is maintained by the Department of Mines for the free identification of minerals, free assays under the provisions of the Mining Act of Ontario, and also for general assay work as per the Schedule of Charges which may be obtained on application.

Publications.

For list of publications, illustrated reports, geological maps and mining laws, apply to

THOS. W. GIBSON,

Deputy Minister of Mines.

TORONTO, CANADA.

PROFESSIONAL DIRECTORY

PROFESSIONAL DIRECTORY

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EDITORIAL

Our Fuel Problem. A Subject For Study

For his first official activity as President of the Canadian Institute of Mining and Metallurgy, Mr. Corless has chosen to draw the attention of the members to the inter-related problems of coal supply, railway deficits under Government direction and the discount on the Canadian dollar; and has invited discussion in the columns of the "Bulletin."

The President could not have asked those who are happy in serving the Institute under his direction to join in a more difficult task, nor a more necessary one. If the Institute is really representative of the mining profession of Canada, as its guests at annual dinners—without noticeable demur from the members—have so often announced it to be; then the President has every right to expect some constructive action to follow from his definite assignment of a difficult duty to the body that by composition and repute is best fitted to discharge it. The President is entitled to receive the loyal support of every member of the Institute. As a body it has not made any worth-while contribution to the solution of the fuel problem. The task may be an impossible one, but it is heartening to see it tackled by the Institute's head, and the membership should not let Mr. Corless down, or disappoint him by silence.

Since the President's letter was written a parliamentary committee has looked into some phases of the fuel-supply question, and has discovered that its solution is beyond the ability of men who are not specialists, that the questions at issue are too many, and of too great difficulty to be reviewed in a few weeks, and as an addition to parliamentary duties.

All that could be asked of a parliamentary committee charged with such a herculean task as full enquiry into "all matters pertaining to the future fuel supply of Canada," was a suggestion as to how the matter might be exhaustively and maturely studied. The Fuel Committee, in its tabled report, suggests a good many things that ought to be done, but is unable to suggest how they should be accomplished, except through the appointment of a Government officer "to keep in close touch with the fuel situation in Canada, and with sufficient power to cope with any emergency which may arise in order that the Canadian people suffer no inconvenience through fuel shortage."

We regard the suggestion as entirely unsatisfying. The man who could, alone and by himself, and unfortified with the advice and backing of the fuel and transportation specialists in active practice in Canada, make any real progress towards solution of our fuel problem does not exist. The brightest intellect and the strongest personality in our country would fail, were he to attempt such a task.

Our fuel problem is not connected with a shortage of fuel in North America. It arises out of a shortage of fuel in Canada. We need enlargement of production in Canada, and ascertainment of the extent to which state aid is required to help the production and distribution of fuel from home sources. The economics of the problem are desperately complicated by national considerations. No fuel officer could undertake to decide personally what should be Canada's national fuel policy, unless he were seeking trouble for himself and others. "The future fuel supply of Canada" the Fuel Committee states, "is a great national problem, and as such requires national action for its solution." This sentence has become trite through much previous restatement, but it is none the less true. National action is only possible after determination of a national policy, and such a policy can not be outlined until many men have taken much thought together. How can the initial efforts of the Fuel Committee be referred to such combined thought?

The "Journal," in this issue, contains a suggestion, made by the Editor in response to Mr. Corless's invitation, which is published in the June Bulletin of the Institute and was written long before the Fuel Committee had reported. It attempts to indicate how a national fuel policy might be worked out, and emphasises the necessity for studying the problem before embarking upon legislative action.

Criticisms of this suggestion, and other letters in response to the President's invitation are asked for in forthcoming issues of the "Bulletin." If by tearing the suggestion to pieces, and exposing its weaknesses, the elucidation of the national fuel problem is assisted,

the Editor's object will be achieved. The Fuel Committee's report, with Mr. Corless's letter and the suggestion referred to afford sufficient points of attack for the least combative of the Institute's members. If the Institute desires to please Mr. Corless the members should do as he has asked them to.

MANITOBA SALE OF SHARES ACT THREATENED WITH ABROGATION.

Writing in "Saturday Night," of Toronto, Mr. F. C. Pickwell confirms an intimation in a letter from Dr. R. C. Wallace, the Commissioner for Northern Manitoba, in our issue of May 13th, that the existence of the Utilities Commission of Manitoba, and with it the administration of the Sale of the Shares Act is threatened with abolition. The forces that are combining to cancel laws of admitted necessity and excellence are stated by "Saturday Night's" contributor to be subversive of good government and commercial probity. One of our most valued Manitoba correspondents states his utter inability to sufficiently express his disgust of those parties in Winnipeg who are endeavoring to break down wise laws that it has been the work of good men, over many years, to put upon the statute books of Manitoba. The article previously referred to states that the movement to abolish the Utilities Commission "having at least partially succeeded, it is safe to assume that the Sale of Shares Act will be next in order . . . to eliminate the present barriers against the itinerant promoter and his get-rich-quick schemes."

It is sincerely to be hoped, for the good name of Manitoba, and for the protection of its nascent mining industry against frustration of growth and indefinite deferment of its development, that the wishes of the reputable members of the mining profession in Manitoba will be listened to before any such suicidal action is permitted. As this journal has previously stated, Manitoba started out well in mining matters. The judicious and public-spirited character of the administration of the mining laws has elicited the admiration of competent judges in the other provinces. Manitoba's mining possibilities have become widely and favorably known. Capital has been attracted, and real progress has been made, and when the Attorney-General of Manitoba at the Winnipeg meeting of the Canadian Institute of Mining and Metallurgy said he regarded the choice of Winnipeg as a meeting place for the Institute as recognition by mining men of Manitoba's great possibilities and as appreciation of the wisdom of its mining administration, he summed up the general opinion of Canadian mining men at that time. It is for Manitoba alone to say whether that fair name shall be perpetuated, or whether a dishonest and seditious minority shall be permitted to undo a good work, well done, the real benefits of which Manitoba is only just beginning to experience.

The Canadian Mining Journal is of course unable to comment on the political complexities that have made an attack on the Sale of Shares Act possible, but it can and will maintain that the act is a good one, a very necessary one, and one that should be enforced to the limit of its powers in protection of the mining industry against those whose chief desire is to achieve fraudulent gains.

THE FLIN FLON PROPERTY.

The recently issued annual report of the Mining Corporation of Canada contained the definite information that this enterprising company now possesses by purchase a majority interest in the Flin Flon property. The extent and worth of the Flin Flon ore-body is familiar to the readers of the "Journal," and Mr. J. P. Watson's remark to the effect that this Manitoba property is viewed by the directorate as "an important acquisition" is conservatively expressed. It is well that so important an ore-body, in a young district of much promise and potential importance should have been acquired by a Canadian company having substantial financial connections with British interests overseas. The range of mining properties which the Mining Corporation has examined during the past year is geographically very wide, including Latin America and Asia as well as Canada, and in view of the small number of properties which the Corporation has definitely interested itself in, in comparison with the very large number examined, its selection of the Flin Flon property is of good augury. The definite announcement to the shareholders will give pleasure to all genuinely interested in the development of Canadian mines by Canadians. We trust that substantial reward for its enterprise will come to the Mining Corporation.

BRITISH COAL STRIKE

One of the leaders of the striking British miners, representing the Derbyshire men, has had the courage to tell the miners that they are dead beaten on the question of their demand for a national wage-pool. Now the miners have been given a chance to vote on the owners' wage proposals, without reference to the vague generalities of the pool proposal, a likelihood of settlement is in sight. It looks as though the present strike would last about three months from its inception, as did the great strike of 1893, after which there was peace in coal-mining in Britain for nineteen years. When Mr. Lloyd George says the public want a permanent settlement, he expressed a general desire that is largely based on the experience of the summer strike of 1893. The miners are so far to be congratulated on their abstention from violence, which was a feature of the 1893 troubles, for which the miners as a class were not responsible. Much the same may be said of the Cowdenbeath riots that marked the opening of the present strike.

ASBESTOS MANUFACTURE IN CANADA.

A recent comment in this column called attention to the desirability of Canadian asbestos companies undertaking manufacture of asbestos into finished articles at or near the asbestos mines in Canada, and the announcement from the Canadian Johns-Manville Company that it is about to erect a manufacturing plant at Asbestos, Quebec, is a sign of the times that will be very generally welcomed. It is especially of hopeful augury that such a large and important user of asbestos as the Canadian Johns-Manville Company, itself a large owner and miner of asbestos in Quebec, should have shown its initiative and faith in Canada at this particular juncture. As a persistent advertiser, with a very pleasing sense of the value of colour and artistic design in its advertisements, the Johns-Manville Company has done a great deal to popularise the use of asbestos, and other fireproof building materials of Canadian origin, throughout North America, and we are glad to note that the first large-scale asbestos-fabrication establishment in Canada is to be owned and directed by competent and responsible people.

SUBMARINE COAL MINING OFF SYDNEY HARBOUR, N.S.

This issue of the "Journal" contains a paper read before the Mining Society of Nova Scotia by Mr. Alex. S. McNeill, reprinted from the "Bulletin," which sketches the history of undersea coal-mining in the Princess Mine from its beginnings and details some of the difficulties under which coal extraction has proceeded in this mine during recent years. The paper, being a plain record of practical experiences, belongs to that category which most enriches the transactions of mining societies, but which it is most difficult to induce practical men to add to. The absence of such contemporary records have caused regrettable gaps in mining literature, and one of the chief objects of mining societies should be to encourage contribution by the members of just such papers as Mr. McNeill's, particularly in regard to matters where the literature is meagre, as is the case in regard to undersea coal-mining.

The difficult working conditions experienced in the Princess Mine, apparently chiefly associated with the heaving bottom, are fortunately, not to be regarded as typical of those that may be expected in the as yet unworked undersea coal-areas of the Sydney field. Some of the difficulties experienced in the remoter workings of this pioneer undersea colliery arose out of lease inhibitions. It was of course unthinkable that the sufficiently difficult extraction of coal at a point approaching three miles under the sea should be rendered still more difficult by configurations of lease boundaries. Natural difficulties were sufficient without the unnecessary imposition of artificial and man-made restrictions, and recognition of this, combined with pressure from the Nova Scotia Government acting as landlords and trustees of the coal-areas for the people of the Province, has led to unification of areas. Attention will now be concentrated on the extraction of coal, which is not a bad idea in coal-mining. Careful perusal of Mr. McNeill's paper will indicate that methods of coal extraction in the undersea coalfields of Cape Breton Island are entering upon a phase that will call for the best professional advice available, for some recasting of methods, and much hard work. It is therefore good to know, in the best interests of the Province, that so far as removal of irksome and quite indefensible lease boundaries, and unification of direction, may prove to be helpful, they have already taken place.

OIL SHALES IN THE MARITIME PROVINCES

We are pleased to include in this issue a letter from Mr. Harold C. E. Spence, of New Glasgow, emphasizing the value of the oil-shales of Nova Scotia and desire to say that this journal does not regard the oil-shales as of "entirely secondary importance," but as "secondary to the availability of flowing petroleum and bituminous coal." There is no doubt about the richness of the oil-shales of Pictou County, particularly the Stellar "oil-coal" seam from which the town of Stellarton was named. There is also no doubt that the possibility of economic competition of oil, distilled from shales, against bituminous coal (used "raw") is greater than at any previous time. The success of an oil-shale distillation industry in the Maritime Provinces would hardly be based upon competition with bituminous coal on the ground, but would turn on to the ability of the oil and distillation by-products to stand the cost of transport to outside markets.

It is understood that large sums of money have been spent in research work on Nova Scotia oil-shales, and that capital is available to undertake large-scale production should markets appear favourable. There is no presently visible reason why the cost of petroleum and its products should materially decrease in Nova Scotia, and (apart from post-war readjustments to fit commodity indexes) there is little reason to expect reduction in the cost of coal production in Nova Scotia. The time is therefore approaching when oil shales may be profitably distilled.

CANADIAN JOHNS-MANVILLE CO. TO MANUFACTURE ASBESTOS PRODUCTS IN QUEBEC.

The Canadian Johns-Manville Co., Ltd., with sales offices at Montreal, Toronto, Winnipeg and Vancouver —which for some years has been operating one of the largest asbestos properties in the world, located at Asbestos, P.Q., has placed contracts for a large manufacturing plant to be located at Asbestos, P.Q., where they will manufacture all classes of asbestos products formerly imported from the United States. These products include asbestos paper, asbestos roofings, asbestos shingles, packings, pipe coverings, asbestos textiles, brake band lining, etc.

Notes on Mining Coal in Submarine Areas at Princess Colliery, Sydney Mines

By Alexander S. McNeil. *

Annual Meeting of the Mining Society of Nova Scotia, Halifax, April, 1921.

IT IS proposed here to present some of the important features connected with the mining of undersea coal from the famous main seam in Princess colliery at Sydney Mines with a view of inviting discussion that may be beneficial and helpful to all concerned.

Perhaps it is not out of place at the moment to say something of the history of mining in this locality; for although it is well known to many, yet there are some to whom it is not so familiar. The story of the General Mining Association's activities at Sydney Mines from inception to the moment of transfer to the Scotia people is interesting, and it is permissible that it should be briefly rehearsed for the benefit of those who are not familiar with the facts.

In the year 1825, Messrs. Rundell, Bridge and Rundell, of London, organized a company called the General Mining Assoeiation, Ltd., which acquired coal seams known and unknown in the whole Province of Nova Scotia from the Duke of York, the latter holding a lease for sixty years by the royal prerogative of George the Fourth. In 1826, the above lease was executed, and Mr. Richard Brown, an eminent mining engineer and geologist came to Cape Breton as manager for the General Mining Association. In 1827, the General Mining Assoeiation, Ltd., took formal possession of the property granted to the Duke of York, and from this time forward coal mining has been carried on uninterruptedly at Sydney Mines.

The first shaft was sunk in 1830 at what is known as the Yard Pit. It was 200 ft. deep. The second shaft, known as the Jacob Pit was sunk in 1834, and was 320 ft. deep.

In 1838, the coal from what was then, and is now, known as the "Old Sydney Main Seam" was for the first time used for bunkering purposes, and its good name was fully established and universally acknowledged both at home and abroad.

In 1849, the Crown released to the Government of Nova Scotia all its interests in the minerals of the Province.

In 1854, the third shaft, known as Queen Pit, was sunk on the Old Sydney Main Seam. This shaft is about 400 ft. deep.

In 1857, the General Mining Association surrendered their claim to all mines and minerals except coal within certain defined limits, thus ending the Duke of York's lease.

In 1864, Mr. Richard Brown retired and was succeeded by his son, Richard H. Brown, lately deceased. Mr. Brown, a worthy successor, continued to manage the affairs of the General Mining Association and their successors, the Nova Scotia Steel and Coal Company, Ltd., at Sydney Mines, up to the year 1901.

In 1868, the sinking of the "New Winning" or "Prineess" was begun. This pit is also on the Old Sydney Main Seam, and was not completed until 1876. The coal was encountered at a depth of 680 ft. The sinking of this shaft, with its attendant difficulties, formed the subject of an interesting paper which was presented before this Society some years ago by the late R. H. Brown.

It is to be noted here that all the above mentioned operations by the General Mining Association were confined to what may be deseribed as the peninsula between Big Pond on the north and Sydney Harbor on the south; a comparatively limited area.

The Princess pit was located as near the coast line at Cranberry Head as possible, for all the land area overlying the main seam in this district was included in the workings allotted to the previous sinkings.

The New Winning or Princess was to be the outlet for the submarine lease of four square miles taken out by the General Mining Assoeiation in 1858, extending one mile southerly into Sydney Harbor from Chapel Point and two miles direetly out to sea, in a north easterly direction, and having an outside boundary parallel to, and two miles from, the coast line. In 1886 this submarine lease was further extended, parallel to the coast line in a north westerly direction, making a total outside boundary of 3 miles in length and coming ashore at Little Pond—making in all about 4 square miles of submarine territory. The underground projection for the new mine included two main haulage ways or angle deeps, one on the north and the other on the south, evidently at a minimum angle of dip to ensure the operation of a plain rope haulage. Later, at a point 2,000 ft. from the pit bottom on the south angle deep, another deep was begun on or about the pitch, to win the coal at the lower levels, as the distance between the angle deeps was increasing rapidly and the haul on the "in between" level was becoming too great.

The underground operations of the Nova Scotia Steel and Coal Company, from the time of their taking over the holdings in Sydney Mines in 1901, followed along the lines adopted by the General Mining Association until about the year 1910, when all deep workings were practically up against the east boundary of the property and it became necessary to acquire additional territory ahead for this colliery. In 1912 a sublease was granted the Nova Scotia Steel and Coal Company, from the Dominion Coal Company's adjoining holdings. This sublease contains 2 sq. miles and is one mile in width. It extends eastwardly 2 miles, where it in turn is bounded by outside leases held by the Nova Scotia Steel and Coal Company. On the acquisition of this sublease, a new haulage way was projected from the shaft through the old workings into the outside territory in a direction best suited to take the coal from the sublease, and at the same time enter their own outer holdings at a desirable point. This new haulage way was completed to the barrier in 1915. It is 6 ft. x 10 ft. inside the timbering and perfectly straight to the face, which is today 12,000 feet from the pit bottom.

It is intended by the foregoing to indicate the extent of operations by the General Mining Association in the

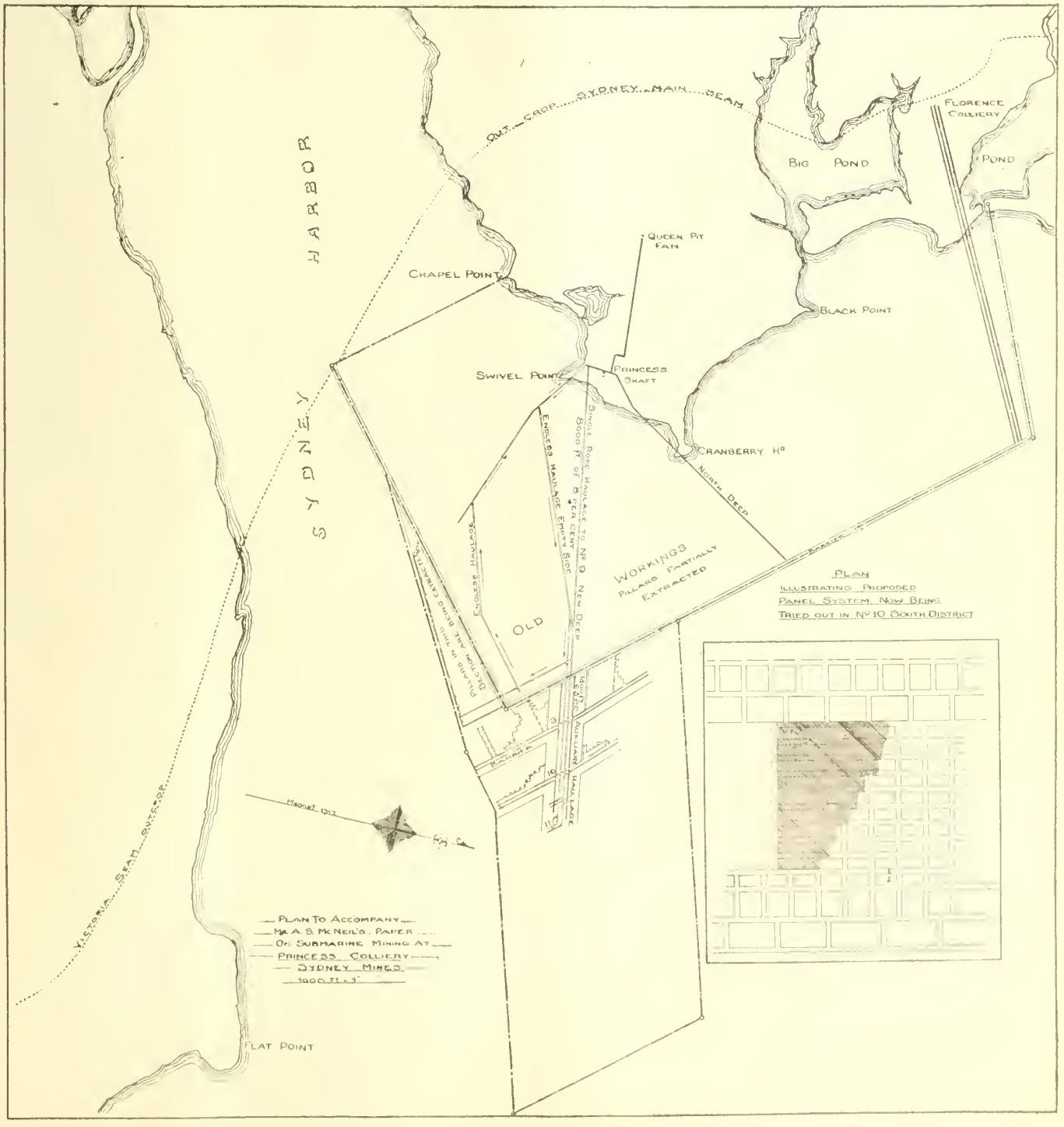
*Superintendent of Mines, Nova Scotia Steel and Coal Company.

famous Sydney Main Seam in the original holdings on land and under the old submarine lease. Future operations, therefore, will be confined to coal lying not nearer than 2 miles from the shore. With the increasing distance, new difficulties arise to tax the ingenuity of those responsible for the colliery's life, not to speak of cost of production.

Under the land, the method adopted by the General Mining Association was room and pillar. Rooms were about 18 feet wide, pillars 30 feet. This proportion of room to pillar did not vary to any great extent.

In the new pit, the workings were laid out with 40 ft. pillars and 16 ft. rooms. This proportion was held for a distance of 2,000 ft. from the pit bottom. The cover at this point was about 760 ft. It appears that the increased size of pillars from 30 to 40 ft. was intended to take care of the additional weight due to increase in cover, but evidently no difficulty of any kind was experienced and eventually the policy reverted to 30 ft. pillars and 16 ft. rooms, which proportion was maintained for another 700 ft. to the dip. At this point the pillar size suddenly jumps to 60 ft. with room 16 ft. as before. Probably indications of the bottom coming up and the other troubles developing were attributed to the smaller pillar in this section. This change from 30 ft. pillars to 60 ft. pillars occurred at a point about 2,700 ft. from the pit bottom, with a cover of about 830 ft. From this point to the outside boundary or to a point about 7,000 ft. from the shaft, 60 ft. pillars and 18 ft. rooms were maintained.

Long previous to this time, pillar extraction was commenced by the General Mining Association, at about the



Plan of Princess Mine, Sydney Mines, N.S., showing Submarine Workings. The charted line indicates lease boundaries, not now necessary to be adhered to. (Plan much reduced from original.)

800 ft. cover line, and a considerable section of the south side was left in bad condition, owing to pillars having been drawn too near their haulage and travelling roads. The effect of this is still evident, and at many places on the working deeps men are constantly employed retimbering and taking up bottom. Evidences of "Crush" are visible in many localities on the new main haulageway through the old workings, and the consequent necessary upkeep of roads is a large item in cost.

The new development from the old Barrier into outside territory is carried on by four deeps, driving in line with the new main haulage way, which is approximately on the pitch. These deeps are 10 ft. wide inside the timbering. Pillars 100 ft. thick are left between each deep; cross cuts in deep pillars are spaced every 100 ft. A barrier pillar 300 ft. thick is left on each side of these deeps. Levels are broken off north and south every 1,400 ft. All pillars in working districts are 70 ft., and rooms are 18 ft. A barrier pillar 200 ft. thick is also left on the low side of the low levels.

The south side of old workings was also extended into a sub-lease of about one-sixth of one square mile, triangular in shape, or about 900 ft. wide on the east to nothing at a point about 4,000 ft. west of this on the south barrier. Rooms had reached the limit in this section in 1919, and pillar extraction had begun, retreating towards the old workings.

Experience in pillar drawing in this district proves conclusively that, under such conditions as obtain in Princess with a cover of 1,000 ft. or over and a roof of the nature found so far, some method must be adopted whereby pillars can be removed simultaneously with the advance of the workings, or, in other words, a panel system, similar to that in some of the large English collieries, must be put into operation.

It is quite possible that a longwall system could be adopted that would give good results, and this may be tried later on. There are, however, in the writer's opinion, seeming objections to longwall, among which may be mentioned a lack of available stowing material and the existing nature of the roof.

It might be mentioned in passing that practically all the area covered by a certain district in this mine one year ago, where cover is about 1,100 ft., is down completely today. To recover pillars will cost as much now as it would to recover them in much older workings. In view of the above the question of timbering might be raised here. It is sufficient to say that one stick of timber was used for a ton of coal, as against one stick for three tons at Florence colliery in the same seam and distant only 2 miles north, where the cover is 700 ft.

It is not intended to infer that the difference in cover referred to is altogether responsible for the difference in conditions at these mines. Undoubtedly the roof in Princess colliery is, on the whole, not so good as at the Florence.

The experiment is now under way in No. 10 district south, to take the pillars almost simultaneously with the advance of the rooms, by the following method. The lift is to be split in two; that is, another pair of levels, 600 ft. to the rise of No. 10, will be driven. Headways are carried up every 200 ft., rooms to be 16 ft. and pillars 30 ft. When top rooms are in 200 ft. both ways, pillar extraction begins and comes along behind the rooms. The inside head is, of course, always a straight line of cross cuts, and when the pillars are extracted up to the working headway, the track is shifted in, and so on. The necessary pillars to support this level will of course be left. If this method can be successfully carried out, the result will be a great saving in datal labor, with a maximum tonnage from the involved area.

The words "successfully carried out" are used advisedly, for it is difficult to foresee how any method of working in the deep sections of this colliery is going to affect the bottom and roof, particularly the bottom. The writer believes that a 70 ft. pillar and an 18 ft. room is the greatest proportion adopted in Cape Breton. Notwithstanding this, the bottom (which is fireclay weathering to a semi-plastic state) squeezes up, seemingly with almost any proportion of pillar to room, where cover is 1,000 ft. or over. To take this heaving bottom up accelerates its movement, and there are places filled by this upheaval from bottom to top. On the whole it is best not to touch it, but to gain any required height by brushing the roof.

At present the coal is hauled from the new deep by plain rope, operating a trip of 40 boxes to a point about 9,400 ft. from the pit bottom. The coal from the lower levels is brought to this point, a further distance of 3,000 ft., by an auxiliary plain rope air driven haulage.

It is interesting to note here that a plain rope haulage is capable of operating over a distance of 9,400 ft. under the conditions obtaining, namely, 8,000 ft. of 8 per cent grade and 1,400 ft. of 6·5 per cent, the road being straight. The writer thinks that this distance may serve as an example of the "ultimate" that may be accomplished by this system of haulage for similar conditions, and, from this, possible conclusions may be drawn by any who contemplate plain rope on haulage ways having a similar pitch. In other words, the best that could be done with a plain rope haulage in this case was to get 40 empty pit tubs, weighing 1,000 pounds each, to drag a one-inch rope a distance of 9,400 ft.; the first 8,000 ft. was falling 8 ft. per 100, and the last 1,400 ft. falling 6.5 ft. per 100. In order to accomplish this, special care was exercised in having rollers, as wide as the road permitted, spaced every 50 ft. and constantly watched in order that they functioned properly at all times. A satisfactory performance for a long haul with plain rope haulage means, primarily, to keep the rope from dragging.

The coal from the pillar sections is taken up on an Endless Haulage System operating on the old south deeps and forming a loop about $3\frac{3}{4}$ miles in length.

It is proposed to handle the coal from the new deep districts by endless haulage on the new road from face to pit bottom, a distance of 12,000 ft. The haulage engine will be motor driven and installed in the pit at the head of the deep and in line with the road.

The ventilation problem at Princess is an interesting one. The deep workings are almost $2\frac{3}{4}$ miles from the down-cast shaft; the fan is 3,600 ft. further to the rise from the down-cast. Two intakes and two returns are available at present with a total cross-sectional area of about 100 sq. ft. each way. The loss in air due to short circuiting is heavy, and the present workings have reached a point where a change in system of ventilation becomes necessary. Much of this loss in short circuiting cannot be overcome, owing to the fact that 8,000 ft. of the air-ways pass through the old workings which are in a fallen state, and in process of crushing at various points. The old stoppings of brick and stone plastered with mortar follow down from pit bottom to barrier intact as far as the stoppings themselves go, but innumerable falls have occurred inside and outside, making it difficult if not almost impossible to prevent leakage of air through shattered roof. In many places, it is impossible to find the stoppings as they are blinded by falling material, to-

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gether with clay stowed from bottom digging. An examination of these blinded cross cuts and room ends, in which stoppings are built, does not reveal any perceptible short circuiting of air; nevertheless there can be no question but that a loss is occurring in many such places. In the face of such a situation it is an interesting problem, considering the cost involved, to know just how far to go in order to remedy the difficulty.

In a paper written by Mr. Tonge and read before the Manchester Geological and Mining Society in 1906, he speaks of a case where 105,000 cu. ft. of air per minute delivered at the fan resulted in only 73,000 cu. ft. per minute reaching the working districts, a loss of 31 per cent; 9,800 cu. ft. per minute were accounted for as being unavoidably lost at certain doors, but the balance of the loss, 23,000 cu. ft., could not be found although diligently hunted for, as he puts it. He does not state the water gauge under which the above loss was made, but does say that assuming a 20 per cent air loss with 1 in. water gauge, a loss of 44 per cent would occur with a 5 in. water gauge. It looks as though the loss that would be unavoidable in Princess colliery, due to the abnormally high water gauge required to give the necessary air, will necessitate an attempt to ventilate this colliery by means of underground booster fans in series, in addition to a surface installation. With workings situated as far from the air-shafts as at Princess, and having a limited cross-section of intake, and return air-ways, there seems to be no other remedy in order that the required volume may be obtained at a pressure sufficiently low to ensure against abnormal leakage, and other consequent difficulties that would arise. The nature of such an installation will be more or less new to Cape Breton mines, but this method is resorted to in other places, as at Hulton Collieries, England, where three underground units, working in series through one down-cast and one up-cast shaft, supply air to three mines.

The pumping problem at Princess colliery is comparatively simple. The old workings to the dip of the shaft are practically dry, and what little water is made from the pit to the face is handled by six small pumps, lifting about 50 gallons per minute, from one to the other, and discharging into the sump at the bottom. At this point a Jeansville pump with a capacity of 500 gallons per minute is located.

This pump was installed in 1902, taking the place of the original Cornish pumping plant erected when the shaft was sunk. It discharges about 300,000 gallons during a 14 hour shift, this being the rise water let into the lodgment through the barrier from the old Queen pit workings, together with the small quantity mentioned before as coming from below.

A new duplicate motor driven installation is now under consideration to take the place of the "Jeansville", as the cost of maintenance on this old pump is becoming too heavy.

In conclusion, the author feels that, while much has been written here which undoubtedly is reiterating ordinary mining practice, as we know it under general conditions in Cape Breton for the past decade, yet a description of operations at Princess colliery from the beginning up to the present was permissible, inasmuch as this mine has been a pioneer in submarine working, and furthermore will in all probability continue to be the pioneer in deep mining for some years to come. Any out of the ordinary phases of operations encountered during development, and there are a few, mentioned here, must be of more or less interest to the profession at the present time.

WORK OF THE GEOLOGICAL SURVEY IN THE MACKENZIE RIVER BASIN.

The Geological Survey has sent four field parties to investigate further the oil and other mineral resources of the Mackenzie river region. The parties are in charge of Dr. D. B. Dowling, Dr. G. S. Hume, Dr. M. Y. Williams and Mr. E. J. Whittaker.

Dr. Dowling will make a detailed examination of the succession and fold structure of the Devonian sediments in the Fort Norman district, where oil was obtained last August by the Imperial Oil Company, and where much additional drilling will no doubt be done this year. He fill follow closely the results of drilling in order that this information may be applied to advantage in the similar underground exploration which is likely to be undertaken in other parts of the Mackenzie basin.

Dr. Williams, Dr. Hume and Mr. Whittaker will begin a systematic mapping and study of the geological formations on each side of the Mackenzie between Great Slave Lake and Fort Norman, with a view to supplying maps and information regarding the depth and form of the oil-carrying rock formations. As the Mackenzie river is the great highway through the region, it seems most likely that future prospecting for petroleum will extend southward along it.

Dr. Williams and Dr. Hume will jointly explore the country on either side of the Mackenzie, from Fort Simpson downstream. Mr. Whittaker will devote his attention similarly to the section from Great Slave lake downstream.

The Topographical Surveys Branch of the Department of the Interior will co-operate in this work by making a careful survey of the Mackenzie river from Great Slave lake downstream, controlled at intervals of about 150 miles by astronomical stations.

The foregoing information has been given for publication in the "Journal" by the courtesy of the Director of the Geological Survey.

IMPERIAL OIL COMPANY'S PLANS.

On his return from Edmonton, Mr. A. M. McQueen, vice-president of the Imperial Oil Company, gave the following statement to the Toronto "Globe":—

"We hope to arrive this year at the stage at all our locations in Alberta and Saskatchewan that will either prove or disprove the existence of oil in commercial quantities. We are drilling thirteen wells outside of the far north, with four at Fort Norman and one at Great Slave Lake, in addition."

Mr. McQueen said that the company's airplanes had been much delayed in their service to Fort Norman through accidents at the outset and now, by reason of the risks, the company was fitting pontoons to each plane in case of necessity of descending on water. One plane had been left at Fort Simpson to be repaired after the first flight toward the north, and the other recently left Peace River, carrying a geologist and a surveyor for the company. The necessity for carrying pontoons reduced the man carrying power of the planes considerably.

Mr. McQueen said that the number of prospectors going to the Fort Norman field was not as great as had been expected, but there was now a considerable traffic by the water route.

The Study of the Fuel Problem of Canada

A Suggestion in Response to the Open Letter of the President of the Canadian Institute of Mining and Metallurgy.

By the Editor, from the June "Bulletin".

THE President of the Institute has invited individual expressions of opinion on three inter-related difficulties that accompany the current stage of national development.

The general problem is complicated by world conditions, the future variation or duration of which no man can forecast. These are, in the main, results of social changes, racial movements, war, and the abolition of old conceptions of time and distance by invention.

Some of the causes of adverse exchange, railway deficits, and shortage of material supplies, are ascribable to these indeterminate factors, but this phase is without bounds, and certainly incompressible into a letter to the BULLETIN. It is mentioned merely to indicate the temporary character of many of our national difficulties, and to lend weight to an assumption that is here ventured, namely, that much of present Canadian financial disability is due to an arrested development, and to a capital expenditure that was made in expectation of an increase in population and wealth that has not materialised. The war has been the principal cause of this arrestation.

The writer, not being either a railwayman or a financier, but only a coalman, inclines to the belief that the difficulties of the railways and of our trade exchanges are temporary only, except insofar as they arise from fuel insufficiency.

This, unfortunately, is an inherent disability of Canada's geographical and national status, but it has been, and will be, a major factor in permanence of railway deficits and in weakness of our exchanges.

A consideration of the President's letter will reveal that, although he has covered the whole ground of national economic independence, population, incidence of business between East and West, and taxation and exchanges, the burden of his presentation is a disclosure of the difficulty Canada is meeting in making herself an independent manufacturing and commercial entity, while retaining national self-government,*in face of an insufficiency of fuel at moderate cost at points of necessary maximum use, in our present stage of development.*

Therefore, it is fair to assume that the most fruitful line of enquiry will be directed towards remedying this admitted fuel insufficiency.

Canada has slowly awakened to the menace of her fuel problem, but at this time is probably more alert to its dangers than ever before.

Long consideration of the problem, and much thinking aloud, has strengthened the writer's belief that no palliation of this country's difficulty is quickly possible, and that relief can only come as a result of the concentration of a number of our best minds upon the problem for a long period.

The course of the enquiry of the parliamentary fuel committee has shown how difficult it is for non-technical men to wrest the essentials of a problem that is in large part technical out of the smother of irrelevant considerations that attend this period of transition and unrest. The assistance of the Institute and other technical bodies in Canada has not been asked by this Committee. The evidence of witnesses has been conflicting, and will be found incapable of being assessed except by engineers of ripened experience. Snap judgments, temporary considerations, personal fads, bias of various kinds, arising from local, provincial and technical affiliations and governmental exigencies, all enter into and vitiate any enquiry into the fuel supply of Canada, *if that enquiry is temporary in its purview.*

The Fuel Controller, Mr. C. A. Magrath, in his final report in 1919, summarised excellently the things that need to be done to assist our fuel insufficiency, but he was unable to suggest the agency through which his recommendations should be carried out further than to recommend that the technical problems involved should be referred to the Honorary Advisory Council.

This body has, in the meantime, made real progress in investigating possible improvements in methods of utilizing lignite and peat, and, under a recent Act of Parliament, will doubtless make more rapid progress.

The fuel problem of Canada is, however, at least as much one of economic and political independence as of technical research.

But for our national frontiers we should have no fuel problem.

Technical research is therefore only one consideration.

The federal interest in the fuel question is complex, and we have not yet evolved in Canada what may be termed the pure federalist, that is to say, a school of thought free from fiscal doctrinism, from provincial affiliations, and from national predelictions entirely absolved from any other interest than that of Canada. How can we obtain a symposium of minds that will give us this single viewpoint?

The problem of fuel supply is inherent in Canada's organism. It is perpetual in its duration and in large measure ineradicable. No single remedy will serve. Many things, many men, must be considered, competently, judicially and maturely.

How can such continued study be given?

Some of the questions relating to our fuel problem which urgently need to be studied, may be mentioned, merely to indicate how great is the field for consideration, and how foolish it would be to attempt a snap judgment, or to recommend any one "cure-all". These questions are, in part:

a. *Extent of Reserves.*

This question is of importance (so far as coal is concerned) only in the two most extensively-worked fields of Vancouver Island and Nova Scotia. In both fields the time has arrived, and gone by, when scientific search should be instituted for hidden coalfields, and for a recapitulation of calculations on the basis of economically recoverable coal.

b. *Use of inferior coals and oilshales, peats and hydro-electric power.*

c. *Economies in use of bituminous coal.*

Super-power stations at pitheads, long distance transmission of electricity and electrification of railways. Central by-product cokeoven plants, furnishing coal-gas, coke (in substitution for anthracite) and heat for communal uses.

d. *Economies in transportation and purchasing of imported coal.*

Summer storage and transportation of imported coal, under government supervision (provincial or federal) to avoid maximum transportation and purchasing costs, and eliminate seasonal panics.

Full use of Canadian railways and canals in transporting coal to Canadian markets.

e. *National Considerations.*

Determination of the extent to which provincial and federal governments are justified in assisting private enterprise in erection of community cokeoven installations, and in developing coalfields and transportation routes.

Determination of zonal areas of coal distribution, and what portions of Canada should use domestic coal and what portions should use imported coal.

What development of Canadian coalmines should be aimed at to secure Canada against cutting-off of coal imports from outside.

The problem is large, difficult, complex and permanent. How can it be given consideration that shall be correspondingly broad-minded, competent, many-sided, and lasting?

The writer suggests selection for this task of a group of men of large affairs, created for advisory purposes only, and given only such powers as shall enable them to obtain relevant facts on which to base recommendations.

Such a body could work in co-operation with producers of fuel, and their enquiries would be made with a view to assisting the producers. No inquisitorial or controlling powers are suggested, because they are unnecessary, and not helpful.

No immediate assistance could be expected from the creation of this suggested body. Their first task would be study, and the partial list of subjects needing study above cited, suggests that study is a most necessary precedent to intelligent action.

No formal taking of evidence, and no publicity of any kind, except reporting of progress and transmission of recommendations, should occur, and the constitution of this select group should be permanent and self-perpetuating to correspond with the everlasting and inherent nature of the problem itself.

The President has asked for concrete suggestions, and the avoidance of generalities, and for this reason the following suggestion is made in some detail. It is, of course, only a suggestion, and it takes for granted what others may well dispute, namely, that the fuel problem is at the root of our railway deficits, and that the necessity to purchase coal abroad, combined with the railway deficits, explain a good deal of the exchange discount.

The constitution of the suggested body might be:

a. Two appointees, nominated by the Canadian Institute of Mining and Metallurgy, preferably a coal miner from the West and one from the East.

b. Three appointees, nominated by the Engineering Institute of Canada; namely, an electrical engineer who has specialised in railway transportation; a hydro-electric engineer versed in generating and transmitting electricity from water-powers; a fuel engineer skilled in modern fuel-applications such as coal and water-gas, oil fuels and coal-distillation products.

c. Two railwaymen; one C.P.R. man, nominated by the Canadian National Railways, and one C.N.R. man, nominated by the C.P.R.

d. A competent economist, preferably in active financial pursuits.

e. An engineer, thoroughly acquainted with North American canal and river transportation and costs, nominated by the Commissioners of Toronto and Montreal Harbours in consultation.

f. The Deputy Minister of Mines at Ottawa, or his nominee selected from officers of his Department.

g. The Chairman of the Research Council, or his nominee from that body.

h. The ex-Fuel Controller, Mr. C. A. Magrath, as Chairman.

As to railway operation, a suggestion has been made in the meantime by the one man in Canada most competent to make it, namely, Lord Shaughnessy. The suggestion is very much what would be made by an average business man if he viewed Canadian railway matters with the detached and unbiased vision that he would bring to bear on any ordinary business deal.

The only additional suggestion one dare make is that Canadian railroads might fit themselves to be coal-carrying roads in Canada, and not coal-owners in and coal carriers from the United States.

F. W. Gray.

Gardenvale, Quebec,
20th May, 1921.

CORRESPONDENCE.

New Glasgow,
Nova Scotia, June 3 21.

The Editor Canadian Mining Jonrnal.

Dear Sir,—Permit me to say I do not think your point is quite tenable in your editorial of the 20th issue in stating that in the Province of Nova Scotia the production of Oil Shales is of "entirely secondary importance". This is not the feeling of those paying over 60 cents a gallon for gasoline, but there are other reasons. The production of oil, whether from Oil Shales or flowing wells, wherever found, seems to me to be of primary importance, to the world to the British Empire and therefore to Nova Scotia, or any locality where found in paying commercial quantity.

Nova Scotia's geographical position to Canada's interior ports, and its accessibility to the markets of the Atlantic and the world, places it in a premier position for the creation of such an industry for export, although its farms, foundrys and fisheries, its steel and shipbuilding works, require the products of its Oil Shales.

World wide conditions make it necessary that Canada be self-sustaining in regard to its petroleum requirements. The Fort Norman oil, if found in abundance cannot be marketed for years, and then can have no influence on Nova Scotia from any conceivable point of view. It must find its way to the Pacific.

The production of oil from inferior coals, coaly shales or screenings will not be able to compete with the low temperature carbonization of Oil Shales, found in such abundance and quality as in the Pictou field.

Yours truly,
HAROLD C. E. SPENCE.

Portland Canal Mines A'coming

By ALEXANDER GRAY, Montreal.

The Portland Canal Mining District in British Columbia is courting more favor from men who know what mines should be than appeared possible ten years ago when premature excitement created more of doubt than confidence. Situated close to the Alaska border, easily accessible by excellent railway and sea service direct to Prince Rupert and Stewart, those who participated in the first rush acquired ground in haste and repented at leisure.

Great mineralized zones were noted, but gave surface values which were not such as to arouse capitalists capable of dealing with a section so remote. Reports that there was a mountain of ore with a shear exposure of a thousand feet vertical, and on one side of which enough ore was assured at outcrop to feed a thousand-stamp mill for a century, started a real-estate boom at Stewart at the head of the Portland Canal and gave added impetus to the boom under way at Prince Rupert where the Grand Trunk Pacific was just completing the western terminus of the Transcontinental Railroad.

The country was difficult; the Great War intervening, it was impossible to bring what pioneers possessed to the attention of mining engineers representing those able and willing to exploit and to fully develop properties whose potentialities never were questioned; although it was felt by open-minded engineers and geologists of repute that where there was so much ore, there should be mines—and mines of magnitude.

Even today, with transportation facilities provided, and notwithstanding the recent activity of leading international mining groups, Portland Canal might not be in the lime-light, had it not been for the advent in 1910 of the blacksmith Logan and fisherman Morrison who staked most of what is the Premier Mine, to which the Guggenheims and affiliated interests are now devoting themselves. The blacksmith and fisherman could not wait; Portland Canal was not for prospectors or small syndicates. Had it not been for Pat Daly, originally a champion wrestler of Kildare, and since then a personality in most of the mining camps of British Columbia, the Logan Group of claims, now incorporated as the Premier Company, certainly would not have induced "one arm" Bush, then champion two-mile amateur skater of the world, to risk what he did, little as it was, before he organized the Salmon-Bear River Mining Company.

Between Logan, Morrison, Daly and Bush, this Company lacked about everything essential to prove a mining country, excepting the practical knowledge of Pat Daly and his optimism. Bush, in 1910, thought he could sell enough stock on a sliding-scale down to a cent or two a share to put the Salmon-Bear Mining Company on the producing map. Daly fancied the large sulphide-zone. He took what petty cash he could get, most of his pay, however, being in shares. What surface work, trenching and stripping he did with the money available, sustained him in his first impression that the Salmon River section was going to furnish both tonnage and values.

The champion skater continued to win honors at rinks. Daly plodding along with hardly more than a grub stake, but stuck it out until the skater wrote him from Vancouver ordering all work stopped. When Daly and his men came out there was no money on hand, and the silver-heeled skater seemed to be beyond the reach of appealing letters. Daly, and his co-workers, could have enforced the thirty-day mechanics-lien law and obtained a lien upon Salmon-Bear Mining properties. Instead of that, Daly went to a bank, put up what stock he had earned in wages, stood good for the amount of the payroll and subsequently the overdraft was squared. In reality, Bush, the skater, had forwarded checks but the person to whom they were addressed mislaid them and they were not found until after Daly had saved the situation. Anyhow, the property was shut down in December, 1912, and work was not resumed throughout 1913.

Daly, however, was not to be denied his opportunity to prove the worth of this district. He interested himself in the International Group of claims south of the Salmon-Bear River Mining properties. These he optioned to the Canadian Mining and Exploration Company which had been financed by wealthy Canadians and Americans. When Engineer Rolph, representing this Mining and Exploration Company, reached the Yellowstone property, Daly, with characteristic candor, stated to him that there was something worth having. Rolph was accordingly taken to the Salmon-Bear River Mines. The surface-showing appealed to Rolph. Daly was entrusted with the expenditure of what he says was the first real money he had seen since he had been in charge of the work. For some unexplained reason other than that the Exploration Company wound up its affairs, the influential people directed Rolph to desist, notwithstanding the work done had established most encouraging values and widths. Rolf left in mid-Summer, 1914, on the outbreak of the war.

In October of that year another group of American capitalists took an option on the properties, the price being fixed at $150,000. Again, under resident and consulting engineers, Daly was installed to superintend the work. Prior to this, it should be explained, two claims sold by Richards and Kerrigan were added to the original holdings of the Salmon-Bear River Mining Company. Meanwhile Daly was not luxuriating on what meant to him a little more than tobacco and overalls. A mineralized zone extending for a distance of 1,700 feet was disclosed. Underground work, while disconcerting, did not discourage Daly. He was obeying orders. Engineers failed to correctly read the section. Certain dislocations seemed more serious to the engineers than they were to Daly.

The engineers carrying on this prospecting and development work gave it up after spending something less than $100,000. Daly, alone, declined to be discouraged. He went to Spokane in June, 1916, after failing to interest others. There he interested R. K. Neill and his partner, Morris Bacon. Daly wanted to get a lease from Bush for $75,000. Daly wrote to Bush who assented to a joint arrangement on a fifty-fifty basis. On those terms Daly took the lease, proceeded to the property, and generally experienced the slings and arrows of outrageous fortune. Heavy snowfalls prevented the pack train from keeping the trail open.

Those tortuous years would have discouraged a less optimistic person than Daly who, being of the type of Mackay, Flood, Fair and O'Brien, of the Comstock Lode, followed the knife-blade of ore. Pat Daly always

had his own ideas but he obeyed instructions. The engineer on the spot, however dubious of the results being obtained at and near the outcrop where No. 1 Tunnel was started on a 40-foot showing, averaging somewhat better than $3, wished to continue the work. The tunnel was to be true to the compass, regardless of the ore. At about 40 feet in, a change in the country was noted. Daly wished to swerve the tunnel. The engineer decided not to. At 80 feet, a slip occurred. Waste rock was being encountered. The engineer on the job was in favor of going ahead on the section. Daly again urged that the tunnel be curved back into the ore. He was disregarded. The tunnel was taken along for a distance of 310 feet. Then an engineer-in-chief, representing the prominent New Yorkers who held the option on the property, arrived. He ordered the work stopped. Daly stuck to his own opinions. So when the engineers abandoned the property and Daly resumed work, he started a crosscut east at a point where the slip had cut out the ore in the tunnel. The second round brought him into ore—and ore that gave him $60. Ordinarily that would have made a tenderfoot, or less experienced than Daly, follow precedent by painting red a town or two. Daly preferred to chase yellow metal rather than invest in "red ink." He enthused over his No. 1 Crosscut and its width. Then, at a point 150 feet from the mouth of the tunnel, he ran another crosscut. He had to go six feet before he got out of the waste and into his ore, but he proved up 35 feet of ore going from $30 to $90. Daly was doing things. He went further along into that tunnel and had another try at crosscutting. This time he was 230 feet from the mouth of the tunnel, and so much further on the angle from the large ore-body. When he reached the ore and got through it, he thought 65 feet of $60-$70 ore was good enough for him though rather rough on those who would not listen to him. Satisfactory as those three crosscuts were, Pat Daly went to the face, 310 feet from the portal, ran No. 4 crosscut and in due course made a note of it that the eighty-seven feet of ore there gave him values of from $150-$300. Besides, he had 200 feet of backs—that being the distance from the roof of the tunnel to the surface. The high-grade character of the large section averaging 87 feet in width proved that the practical miner, familiar with the country in detail, was worthy of more credence than leading engineers who were within two rounds of the ore were prepared to concede to him. At that moment the Premier Mine was a great unnamed. Daly, on his own initiative, had made it a mine—the Premier Mine of its kind.

The nearest telegraph office was at Anyox, 135 miles away. Daly guarded the samples he wished to have assayed at the Granby Smelter. He concluded that if Leander could swim the Hellespont, there was no earthly reason why a determined son of Kildare could not take a chance in a row boat and get across to Anyox. It was February, the dead of Winter, and in that latitude the most intrepid either stay on the work or seek more congenial surroundings. Daly would not be dissuaded. He took a row boat and with the aid, when the wind was aft, of a jury-rigged gunny sack, in three days and three nights, reached Anyox, made the tests of his ore, and got in touch with Bush and Neill, who gave little thought to what Daly was undergoing to convince them he had the makings of a mine.

At any rate, Daly turned the trick and eventually Bush dealt with Neill, Trites, Wood and Wilson. The Premier Mining Company was organized. As this transaction is somewhat involved and law suits are pending, details need not be recited. Daly had not seen Bush from March 6, 1917, to March, 1918. He had superintended all prospecting and developing. He was persistent and his sole reward thus far is the knowledge that the old Salmon-Bear River Mining Company is now the Premier Mine, owned by the Guggenheim-Keith-Untermeyer-Trites-Wood-Wilson Combination. This occurred in 1919 after the Guggenheim engineers had passed judgment on the properties.

Since then, development work has more than borne out the rugged confidence of Daly. The judgments of previous engineers have been shown to be at fault. An aerial tramway to tidewater is almost completed. A plant has been constructed. Meanwhile, when the roads to Stewart permitted it, continuous shipments have been made to the Tacoma Smelter. Unofficial reports give the average of what has been shipped at between $200 and $300 to the ton. Of course, this cannot be regarded as an average of the large zone developed.

Daly says the grade is good enough for the most exacting. He is more than ever a firm believer in the present and future of the Portland Canal District, and in this he has the advantage over those who misunderstood the structural features. In manifesting this optimism, Daly declares "Portland Canal is big enough for the biggest—and that should be big enough for anyone who knows what it means to have such great sections and strong mineralization."

Capital expenditure under way and authorized by Guggenheim engineers, is a sufficient rejoinder to those who felt the Portland Canal would be too low-grade to warrant such expenditure. Pat Daly has seen the Premier mine, in the finding and developing of which he played such a conspicuous part, ship 320 tons worth $62,000 and 410 tons worth $68,000, other shipments correspondingly profitable, and now declares the mine to have a present day value of $50,000,000. He is suing to recover $2,000,000 as his portion. That, however, is another story. Daly has more pride in the properties strung along that "hog back" than anything else. Like successful men of his type he never could be pessimistic, but finds himself divided in his affections, between the Big Missouri properties north of the Premier, the Eva, Young and other groups south of the Premier. Leading engineers are now being convinced that Daly common-sensed what the scientific could not discern. In this respect, history has repeated itself. Many discoveries have violated the conventionalities. The diamond fields of Kimberly, were denounced as a rank attempt to promote speculation in worthless lands. One of the greatest authorities of that time went on record as staking his reputation that the Witwatersrand pebble-beds, discovered by Struben, were a mere superficial occurrence. Trusted chiefs in the employ of diamond magnates, after Tom Cullinan found it, turned down the Premier Diamond Mine, the largest individual mine of the kind on record. The wisest of engineers ridiculed Cobalt; others regarded the Porcupine gold-fields as a flash in the pan. Had it not been for Pat Daly's dogged persistence, reinforced by his intimate knowledge of the Portland Canal mineral zones, the Premier mine today would not exist. Daly insists that well meaning engineers have condemned what they did not comprehend. He has the intense satisfaction, contained in the official announcement of the Canadian Department of Mines, that the Salmon River District has arrived. Mr. J. J. O'Neill, of the Canadian Geological Survey, in a report which

was recently issued by the Ottawa Department of Mines, fully confirms Daly's contentions regarding the Premier, Big Missouri and other properties. In part Mr. O'Neill says:

"In 1904 prospectors from the Bear River Valley crossed the divide into the country at the head of Salmon River and staked the Big Missouri claims, which have an enormous outcropping of mineralized rock. This discovery caused an influx of prospectors, and soon most of the district was staked. The district was considered, up to 1917, to be one of large deposits of low-grade complex ores, and the development was with a view to ascertain if sufficient quantities of workable ores could be proved to warrant the large expenditure required to exploit them. During 1917 very high-grade silver-ores were found on a number of properties, and the district has rapidly come into prominence as a prospective high-grade camp, as well as a possible low-grade one on a large scale; all efforts at present are devoted to proving the high-grade properties, and one exceptionally rich property has become a producer. Several others show a reasonable prospect of becoming such.

"The primary high-grade silver-ores are found in quartz veins or silicified shear-zones about the borders of the granodiorite-porphyry intrusive. These veins for the most part stirke northwest, although a few strike northeast, and they cut the regional shearing at 45 degrees. Properties containing high-grade ores, so located, include the Big Missouri, the Mineral Hill, Bush Mines, Ltd., and the Premier. There are many other properties, but the occurrence of high-grade ore in them has not been demonstrated."

SUDBURY NOTES.

D. E. CUSHING.

Continued Search for Coal in Chelmsford Area.

After 25 years of uncertainty, during which much money has been spent and practically wasted, the question of whether or not the Chelmsford area will produce commercial coal is soon to be solved.

A company called The Financial Underwriters Limited, has been organized by Toronto and United States people and it is the intention to soon explore the whole area at great depth. The diamond drill will be used. Right now the agents of the company are purchasing the mineral rights of the farmers. When they have secured all the rights they desire they will start work.

The agreement with the farmer calls for the payment of $1 for their mineral rights. If coal or salt is found, the farmers are to be paid 10 cents a ton for all taken out. If gas or oil, the needs of the farmers are to be supplied. The purchase or lease is for 21 years. The company is endeavouring to secure a lease on the mineral rights of a strip of land about one mile wide and stretching through the townships of Dorling, Rayside and Blezard, a distance of about fifteen miles. This strip passes about seven miles from Chelmsford. It is understood that the diamond drilling, already carried on in the district was all done in the township of Dorling. Recently some geologists and a Pennsylvania coal man paid a visit to the district. It is understood that the coal man was favorably impressed with the formation.

Goudreau Dstrict.

A new gold find in Goudreau is reported by W. F. Webb. It is in Township 28, range 26, and according to Mr. Webb, one of the owners of the original find in the area (the McCarthy-Webb claims) it out-rivals the famous Croesus in Munroe Township. He claims that without doubt it is the most spectacular free-gold discovery ever made in the province. The new find extends the known free-gold area of Goudreau camp from the centre of township 28 in a northerly direction through townships 48-49-47, a distance of over 22 miles and connects up with the C.P.R. at Lochalsh station.

The gold zone occurs in Keewatin rocks similar to those that have been so productive in other parts of the Province, and has a width around 12 miles. Many express the opinion that the North east arm of the body connects with that of Porcupine. Niven's base line runs through the village of Franz and also through the town of Timmins, a distance of 184 miles.

The Goudreau area has been favored with a large percentage and assortment of porphyry rocks, which seem to be essential to all gold camps of economic value.

At the same time this camp can also boast of the largest known deposits of commercial pyrites in America. Some of these deposits have been diamond-drilled, and have shown very large tonnage and average sulphur content up to 45 per cent. This ore is equal to any of its kind anywhere in the world. It is preferable to the Spanish ores on account of its free-burning quality, with exceptional transportation facilities, both by water and railroad.

Since the recent strike quite a number of prospectors have gone into the area. It is understood that James Perry and Thos. Murphy are the owners of the claims in question and fifty new claims in their vicinity have just been recorded. On one of the claims, it is said one of the spectacular veins has been opened up 200 feet. There is said to be lots of free gold but so far systematic sampling has not been carried out.

Shining Tree District.

Quite an interest is being taken in Shining Tree these days by outside capital. Several parties have gone in from this point during the past week or so to look over properties, but it will be some time before it is known if deals go through. There is not a tremendous amount of work being done in the camp on the main properties, outside of perhaps The White Rock, but the promise is that there will be a new activity there shortly.

Sudbury is not pleased with the news that the new light railway from the mining camp is to reach Shining Tree from the T. and N. O. Ry. At the present time all the Shining Tree supplies go in from Sudbury. The outlook is that the light railway will divert all business from Sudbury, as it does not seem to be the intention of Premier Drury to allow the light road to connect with the C.N.R.

TORONTO COAL PRICES.

Toronto, June 8th.—The price situation of coal is absolutely unchanged since last week. Prices are exactly the same as last week's in all lines. There is practically nothing doing. It is unquestionable that the public are holding off from buying, at the present time, in the expectation of a reduction in freight rates. But what is most likely actually to happen is that the market will strengthen up before the expected reduction in freight rates takes place. If people, who, in normal circumstances, would buy their coal now, continue to hold off, there will be a rush on the market, when the buying of coal can no longer be postponed, and prices will be sent up with a rush. It is surely better to store up coal rather than trouble, which is what the public are doing for themselves by postponing their normal purchases of coal.

Northern Ontario Letter

THE SILVER MINES.

The Cobalt Field.

What has the appearance of being an important ore-body has been encountered during the course of lateral work at the lower levels of the Chambers-Ferland mine. This work has passed through 30 feet of ore in which the silver content averages over 50 ounces per ton and, as yet, the walls of the deposit have not been determined. The peculiar formation of the ore-body renders it impossible to tell whether the lateral work is being carried in the direction of its strike or crossing the deposit. Further work is proceeding, and the shipment of ore from the new discovery has already commenced, arrangements having been made to send approximately 50 tons daily to the Bailey Customs Mill.

The annual statement of the Mining Corporation of Canada contains a number of favorable surprises. Among these may be noted a very substantial increase in ore reserves, the total being estimated at 2,181,000 ounces as compared with 1,307,220 at the end of the preceding year. It is announced that Sir Henry Pellatt has resigned from the Board and has been succeeded as president by J. P. Watson, formerly first vice-president. Other new members on the board are E. H. Rose and Captain C. E. Trafford, while D'Arcy Weatherbee's name disappears from the list of directors. In summarizing the situation, J. P. Watson, president, states: "Our old properties are being gradually exhausted, as is seen by our reduced estimated reserves, but we are pleased with our new acquisition, the Buffalo Mine, from which we have taken practically no ore during the year, but our exploration and development work there has put so far into reserve the amount estimated by our engineers. As is plainly evident by our year's operations, the profit of the Corporation in the future will be largely determined by the price of silver."

Reference is made in the report of the consulting engineer of the Mining Corporation, Mr. Scott Turner, to an interest held in an option on a gold, silver and copper property in Northern Manitoba (the Flin-Flon). This option lapsed on March 31st, 1921, and Mr. Watson states that the Corporation early in May acquired by purchase a majority interest in this property. "There has been spent on it during the past few years, $500,000 in exploration work and proving the ore bodies with diamond drills and we view it as an important acquisition to your corporation."

Following are some leading features of the report of the Mining Corporation:—

	1920	1921
Silver production, ounces	1,661,018	1,230,652
Net profits	$ 579,569	$ 908,712
Total income	$1,693,065	$1,698,996
Income per ounce, cents	101.75	137.32
Bal. profit and loss	$3,268,628	$3,311,577
Dividends paid	$ 622,518	$ 622,518
Cash in bank and on hand	$ 119,057	$ 538,282
Total assets	$11,666,685	$11,712,350
Profit per ounce, cents	36.58	76.80
Average number of men employed	226.63	196.79
Ore reserves, ounces	2,161,000	1,307,220

Since 1908 the properties of the corporation have produced 32,217,505 ounces of silver.

Work is being carried on in a small scale on the Silver Leaf property under lease. The ore is shipped to the Bailey Customs Mill.

It is reported in Cobalt that the Bailey Silver Mines Company is negotiating with a view to acquiring an interest in a promising gold property in the Kirkland Lake district. The Bailey is making regular daily shipments of ore, and mill-heads have recently averaged approximately 28 ounces of silver per ton. Underground developments are favorable at the 5th level.

Elk Lake and Gowganda.

The representatives of a big steel corporation in the United States has gone in to inspect the Hartley-Wescott property in the townships of Morel and Yarrow where recent discoveries of high grade iron-ore were made. It is regarded as being unfortunate that the Ontario Department of Mines gave out quite pessimistic views in regard to the new find. Officials there took it for granted that the reported discovery was that on which one of their geologists made a survey in 1911. As to this, Mr. Percy Hopkins, the geologist who was in that vicinity in 1914 was consulted and made the statement that his visit was only to the deposits lying along the boundary of the two townships and not to the new find which was recently made. Mr. Hopkins believes that even that part of the deposit which he saw warrants detailed investigation and appears to be quite optimistic as regards the reported new high grade find. Like Mr. Hopkins, the discoverers of the deposit share the belief that it is purely a diamond-drilling proposition and that exploration work will be a necessity as a means of determining whether the deposit occurs in sufficient volume to be of commercial value on a big scale, or not.

Work is being carried on on a small scale on the property of the Alpine Silver Mines, and some high grade ore is being bagged preparatory to making a shipment in the Autumn.

During the month of May, the O'Brien Mine at Cobalt produced 312,000 ounces of silver, thereby jumping to the front rank of all silver mines in Canada. Taking the premium on United States funds into consideration, which makes silver worth about 65 cents an ounce in Canadian money the month's output from the O'Brien had a value of over $200,000. Heretofore, the Nipissing has been the leading Canadian silver producer, but at no time during the first four months of the current year has the output exceeded $150,000 a month. The O'Brien treated 6,066 tons of ore which yielded an average of a a little over 51 ounces per ton.

THE GOLD MINES.

The Porcupine District.

Following the meeting of the directors of the Porcupine V. N. T. Mines., a committee was appointed for the purpose of making arrangements to reopen the mine. The company has 175,000 shares in its treasury, and it is understood the committee may make arrangements to have this underwritten at a price which will provide the money required to enlarge the mill and extend the underground workings to a depth of 900 feet. A price of 40 cents a share for the treasury stock is being mentioned.

A Toronto syndicate is stated to have purchased control of the Hollinger Reserve property, situated in Deloro Township, a few miles south from the Hollinger. It is planned to carry on exploration work this year.

The directors of the Hollinger Consolidated have just concluded a visit to the mine where a special meeting was held. The nature of the business has not been officially disclosed, although the question of hydro electric

power development is believed to be among the important matters discussed.

A party of stockholders of the March Gold property visited Porcupine during the past week. It is understood a limited amount of exploration work is being planned on this property during the current summer.

Production from the Hollinger, Dome and McIntyre now amounts to an aggregate of close to $1,500,000 a month and the net profits being realized amounts to approximately 40 p.c. of the gross output. Dividends this year from these three mines promise to reach a greater aggregate than in any previous year, as well as witnessing a big increase in the treasury surpluses as shown at the end of 1921. It is also believed the ore reserves will increase substantially, due to the companies now being able to get a full supply of men. It is considered not at all improbable that the aggregate reserve at these three mines may approach $60,000,000 by the end of this year.

Among the various new gold discoveries reported recently on outlying properties is one in the township of Midlothian. The details about the find are lacking except that it was found by Nease Twain, a local Indian, but the location of the find makes it interesting as it lies almost in a direct line between the West Shining Tree gold-area and the Fort Matachewan district. It appears to form another link in that long belt of territory over which gold has been found, extending all the way from West Shining Tree on the south-west through Midlothian, Fort Matachewan, Kirkland Lake, Beaverhouse Lake and Larder Lake on the north-east, a total distance of about 150 miles in length.

Kirkland Lake.

Contracts for the milling machinery of the Ontario-Kirkland are being closed, and early delivery is specified. All will be in readiness to commence pouring cement for the mill foundations within the next few days, and it is planned to place the mine on a producing basis by late Autumn. A substantial quantity of the ore will average around $15 per ton.

A high rate of recovery is being established in the new mill on the Wright-Hargreaves. This mill will treat an average of about 170 tons daily when operating at full capacity, and mill heads are expected to average about $15 per ton. This would indicate an output of over $900,000 a year by such time as the enterprise is brought up to full capacity which may be by early Fall. The former highest rate of output for any company operating in the Kirkland Lake district was on the Tough-Oakes which some years ago produced at the rate of over $60,000 a month for a short period.

Fire destroyed the mill and transformer house at the property of the Argonaut Gold, at Beaverhouse Lake. The loss incurred is estimated at $5,000. The mill was more or less obsolete and was being used chiefly for testing purposes and for this reason the loss will not seriously retard the development of the mine. A new transformer has been purchased and is already in course of transportation to the mine. This company is making good headway in developing ore at depth, in spite of having been operated under the handicap of poor transportation. The question of installing a new modern mill will not be taken up for the present, and in the meantime the prospects are that rail transportation will be provided by that time through the construction of a line by the Northern Light Railway Company, the proposed route of which lies right across the Argonaut.

Mr. Burrows and Hopkins have completed their geological survey for the Ontario Government in the northern part of the township of Skead, and a map will be ready within the next two months.

A diamond-drilling contract has been given to Messrs. Smith and Travers for the purpose of exploring the Cockeram property near the Fort Matachewan Gold Mines. This work is already under way.

It is learned that a great many mining claims have been staked during the past two or three weeks in the Fort Matachewan district on the strength of the prospects of light-railway transportation being provided this year for that field.

TORONTO MINING STOCK QUOTATIONS.

Quotations on Active Stocks on Standard Stock Exchange for Week Ending 4th June 1921.

Silver.	High.	Low.	Last.
Aladdin Cobalt	1	1	1
Beaver Consolidated	32.4	32.4	32.4
Chambers-Ferland	6¼	6¼	6¼
Coniagas	1.50	1.50	1.50
Crown Reserve	13	10¼	11
Gifford	⅞	⅞	⅞
Hargraves	1¼	1¼	1¼
La Rose	18½	18½	18½
McKin.-Dar.-Savage	18	18	18
Mining Corp. of Can.	1.25	1.07	1.25
Nipissing	5.15	5.00	5.00
Ophir	1⅜	1⅜	1⅜
Peterson Lake	5¼	5¼	5¼
Silver Leaf	1½	1¼	1½
Temiskaming	20½	20	20
Trethewey	17	16½	17
Gold.			
Apex	2	2	2
Atlas	21½	20	20¼
Dome Extension	70	65	65
Dome Lake	4¼	3½	3½
Domes Mines	20.70	19.85	20.00
Gold Reef	3¼	3¼	3¼
Hollinger Cons.	7.30	7.15	7.15
Hunton Kirkl'd G.M.	10	10	10
Inspiration	4	4	4
Keora	13½	12½	12½
Kirkland Lake	48	47	47
Lake Shore M. Ltd	1.31	1.14	1.14
McIntyre	1.99	1.94	1.94
Newray Mines, Ltd	6	6	6
Porcupine Crown	22½	20½	21
Porcupine Imperial	½	½	½
Porcupine V.N.T.	22½	20½	20½
Schumacher	23	20	20
Teck-Hughes	16	12	13½
Thompson Krist	6½	6	6
West Dome	7¾	6½	6½
West Tree Mines Ltd	4⅝	4	4
Oil.			
Vacuum G.	6¾	6½	6½

MONTREAL METAL QUOTATIONS.

Following the fair average prices for ingot metals (in less than car-loads) at Montreal:

	June 1.	June 8.
Copper, Electric	18¼	18¼
Copper, Casting	18	18
Tin	39½	38
Lead	7¼	6¾
Zinc	7½	7½
Aluminum	32	32
Antimony	7½	7½

British Columbia Letter

Stewart, B.C.: Labour trouble, growing out of a reduction of wages, has stopped work at the Premier Mine, Salmon River, Portland Canal District. Dale L. Pitt, the manager, recently announced a "cut" which would place the men's pay as follows: Miners, $5.50 a day; muckers, $5; laborers, $4.75 and $5. The men claim that this is too drastic a change, that it means a reduction ranging from 75 cents to $1.25 a day, and that there has not been a corresponding drop in the board and lodging charge of $1.25 a day. For these reasons the mine workers left their work and, according to reports, 200 of them "hit the trail" to Stewart. There a meeting was held to voice their protest and to organize for a strike. Resolutions were passed providing for the housing of the strikers and for the picketing of the road to the mine, it also being decided that no freight for the Premier would be handled at the dock and that the workmen on the tramway would be interviewed. The mill crew and the tram workers, from last advices, are not affected. Two hundred tons of ore were shipped south by the Str. Prince Albert which left Stewart a week or more ago, the same having been loaded by men who had not joined the strike.

The Mineral Hill Group of Claims, Salmon River, is likely to be extensively developed this summer. R. Martin, one of the original locators, is at the property now to ascertain the condition of the buildings, preparatory to starting operations. He says that, although 700 feet of underground work had been done, it had not yet been satisfactorily proved that a mine can be made of the group. He thinks, however, that the prospects are just as good as they were in the case of the Premier at its opening stages.

The Patricia Group, Marmot River, is another property to receive attention. Crawford McGee has outfitted and left for the claims. He states that ore has been taken out running $12 in gold and $10 in lead and silver and that there is a promising lead.

The Georgia River Mining Company has taken an option to purchase a one-quarter interest in claims known as the Georgia, Georgia No. 1 and Georgia No. 2, situated on the west side of the north fork of the Georgia river, seven miles from tidewater and seventeen miles from the town of Stewart. As the option expires in September it is assumed that considerable work is to be done this summer. Nothing has been done since 1918, but prior to that a 700 foot tunnel was driven and a 40 foot winze sunk. There are two leads, a 20-foot quartz vein, running east and west, and an 18-inch fissure vein running north and south. Both are traceable on the surface. The values are in gold, the quartz vein averaging about $100 in gold.

Alice Arm B.C.: The Dolly Varden Mine, which closed down towards the end of last year, is to be re-opened for development according to a statement by Major G. B. North, the manager. Major North has returned to make a survey and a report on the properties. With market conditions as they are shipping will not be resumed. When it is started the expectation is that the output will exceed all previous records in volume. Properties on the Illiance river are showing up well and the trail now is being put in condition for the shipment of supplies to the Bellevue, Silver Star, Monarch and to the properties of other smaller operators.

Queen Charlotte Islands: A party of miners is engaged in another attempt to separate the fine gold from the black sands of the beach near Masset, Graham Island. They have taken in a machine for the purpose, but their work is not yet far enough advanced to say whether or not it will be successful. For a long time it has been the opinion that these sands were just rich enough to keep the miner working but poor. If the patented process now being employed gives the results predicted there is no doubt that a number will be introduced and operations carried on extensively.

Copper prospects on the Islands are idle at present because of lack of a market for the products but considerable interest is being manifested in iron ore deposits, no doubt by reason of the continued activity of those agitating for the establishment of an iron and steel industry on the coast. There are immense bodies of magnetite of high grade and options have been taken on several properties, notably those on Lyell Island, Louise Island, at Jedway, and on Collison Bay.

Hazelton, B.C.: Preparations are being made by the Kleanza Mills, Mining, and Development Co. for an exhaustive examination of the mineralized zones of Kleanza mountain. Near the base of the mountain is the great contact zone between the coast-range thrust and the older formations of the Interior. The field is considered to be one meriting attention and the Company proposes to give it thorough exploration.

Revelstoke, B.C.: The Walters Investment Co., of Spokane, Wash., is reported to have purchased the Waverly-Tangier Mine Property, situated at the head water of the Downie Creek. The monetary consideration had not been disclosed but $20,000 already has been paid and $10,000 is being spent in preliminary development, this including the re-construction of eight miles of the wagon road from Albert Canyon to the property. As early as 1896 a considerable amount of prospecting work was done on these claims by a company called the Gold Fields of British Columbia, Ltd. To give access to the property a wagon-road was built for a distance of about 28 miles up the north fork of the Illecillewaet river from Albert Canyon, on the main line of the C. P. R. Work was abandoned many years ago, the old wagon-road became obliterated in many places, and it was not until 1918 that work was resumed by a small crew of men. There are possibilities, it is reported, of opening up a considerable body of low grade silver-lead ore. The mine is situated in the heart of a vast undeveloped country and its progress will be watched with interest, for if successful it should lead to more mining activity north of the C. P. R. line.

Nelson, B.C.: The Omineca Branch of the B.C. Prospectors' Association has written the Nelson Branch expressing approval of the fight being made against the Engineering Professions Act, which speaking in broad and general terms is designed to protect members of the profession against the competition of unqualified men by compelling all who would practice to become members of the Engineers' Association. The

Omineca prospectors also have declared against the present reserve on coal lands and are asking the Provincial Government to remove the same forthwith.

Mrs. Alice E. Jowett, one of the pioneer prospectors of the Lardeau District, B.C., and probably the only genuine "sourdough" woman prospector of the Province, has returned to her home at Trout Lake after attending the International Mining Convention at Portland, Ore. She quotes Americans as saying: "We are willing to invest in your mines, but we would lose our investment as the smelter situation is agains us. If we produced ore your smelter would not take it and we would have to ship it on this side to be treated." The Trail smelter, she asserts, does not seem to want to be bothered with the small shipper. With this preparation Mrs. Jowett asks that the government provide a customs smelter or make some other provision for the treatment of the product of the small operator. At this point it is only fair to say that there is a circle in the Kootenays who hold very different opinions regarding the Trail Smelter, considering its policy a fair one and its enterprise of incalculable benefit to the country. Mrs. Jowett, be it understood, is not a fair-weather prospector. Mining is her business and she has a practical grasp of its problems as well as of its possibilities. The Foggy Day Group, one of her properties, she considers to be a "bonanza". She tells with pride of its four-foot gold-bearing ledge, refers to the schist on either side as being studded with particles of gold, and describes it as a quarrying proposition. She has explored this gold-bearing schist for 18 feet without finding the walls and says that the whole hill could be worked with a steam shovel. There also are the You and I Group, the Bronze Group, and the Hercules and the Arraloo Groups. All are in the Alpine basin where are a creek and three lakes, assuring the necessary water-power for the operation of the mining plant which some day, she is confident, will be handling the mineral treasures of her district.

Trail, B.C.: Ore receipts at the Trail Smelter of the Canadian Consolidated Mining and Smelting Co. for the week ending May 14th last totalled 8,676 tons, all of which came from the company mines. The total receipts for the year thus are brought to 158,075 tons.

Vancouver, B.C.: D. G. Marshall, K.C., one of the directors of the Britannia Mining and Smelting Co., has stated that the plans for the new concentrating plant, to be built in place of that recently destroyed by fire, are being prepared and that work will be started in the course of one or two months.

Victoria, B.C.: Twenty tons of iron ore are being shipped from the Lake Hill Mine of the Puget Sound Company's Group on the west coast of Texada Island for a test run in the electric furnaces of the firm of Thomas Summerson and Sons, Ltd., Darlington, England. Hon. Wm. Sloan, Minister of Mines, has ordered that this ore be forwarded and, in order that the trial of the magnetite of the province may take place early this summer, it is to be on its way by the 1st of June. Application for the ore was made by Percy Scott Leggatt, of Thomas Summerson and Sons, Ltd., through F. C. Wade, K.C., agent general for British Columbia in London. Mr. Scott observes that "we are much interested in the potentialities of your Province as an iron and steel producer." His firm is prepared to offer technical experience in the development of the iron ore resources of British Columbia and in this connection Mr. Scott expresses a preference for the electrical smelting process as against the blast-furnace practice to achieve the economic exploitation of the magnetite deposits of the Pacific Coast. He adds:

"Before proceeding to detailed discussion of ways and means of bringing suitable iron areas into productivity, we would wish to assure your government of our ability to smelt the ores. If, therefore, you can arrange for shipment to these works of at least 20 tons of magnetite, we shall be happy to give you and your appointed technical experts a demonstration 'smelting-run' in our electrical furnaces."

W. H. Craigo, Frank Hutchinson, L. D. Davenport, W. R. Appleby, W. J. Mead, and W. H. Emmons are among American geologists and mining engineers who are looking for passage to the Orient by the N. Y. K. liner, Kashima Maru, which sails on June 3rd next. They are being sent to China, it is said, by American agents of the South Manchurian Railway Company, for the purpose of making a survey of the iron and coal deposits of the territory traversed by the railway indicated.

Dawson, Y.T.: Navigation has opened. Winter's grip is loosened. Steamers are beginning to traverse the rivers. Miners, prospectors and freight are on their way to the Mayo Silver Camp. Some gold dredges already have started and others are ready to commence the season's operations. The first gold of the season has left Fairbanks for Dawson and shortly steamers will be en route out with the results of the spring clean-ups of the various Klondyke camps. F. R. Short, manager of the Yukon Gold and Silver Mines, Keno Hill, on arrival at Dawson from Mayo City reported that development work already is well underway at the new camps and would continue throughout the open months.

A SILVER INDEX-NUMBER.

Taking the parity of 1 gold to 15½ silver as 100, the Journal of the Royal Statistical Society in its issue for March last calculates as follows:—

		Price per oz. in pence.	Index number.
Average	1873	59.1/4	97.4
"	1893	35.5/8	58.6
"	1896	30.3/4	50.5
"	1909	23.11/16	38.9
"	1912	28.1/32	46.1
"	1913	27.9/16	45.3
"	1914	25.5/16	41.6
"	1915	23.11/16	38.9
"	1916	31.5/16	51.4
"	1917	40.7/8	67.2
"	1918	40.7/8	67.2
"	1919	57.	93.6
"	1920	61.9/16	101.2

PROVINCE OF QUEBEC

MINES BRANCH

Department of Colonization, Mines and Fisheries

The chief minerals of the Province of Quebec are Asbestos, Chromite, Copper, Iron, Gold, Molybdenite, Phosphate, Mica, Graphite, Ornamental and Building Stone, Clays, etc.

The Mining Law gives absolute security of Title and is very favourable to the Prospector.

MINERS' CERTIFICATES. First of all, obtain a miner's certificate, from the Department in Quebec or from the nearest agent. The price of this certificate is $10.00, and it is valid until the first of January following. This certificate gives the right to prospect on public lands and on private lands, on which the mineral rights belong to the Crown.

The holder of the certificate may stake mining claims to the extent of 200 acres.

WORKING CONDITIONS. During the first six months following the staking of the claim, work on it must be performed to the extent of at least twenty-five days of eight hours.

SIX MONTHS AFTER STAKING. At the expiration of six months from the date of the staking, the prospector, to retain his rights, must take out a mining license.

MINING LICENSE. The mining license may cover 40 to 200 acres in unsurveyed territory. The price of this license is Fifty Cents an acre per year, and a fee of $10.00 on issue. It is valid for one year and is renewable on the same terms on producing an affidavit that during the year work has been performed to the extent of at least twenty-five days labour on each forty acres.

MINING CONCESSION. Notwithstanding the above, a mining concession may be acquired at any time at the rate of $5 an acre for SUPERIOR METALS, and $3 an acre for INFERIOR MINERALS

The attention of prospectors is specially called to the territory in the North-Western part of the Province of Quebec, north of the height of land, where important mineralized belts are known to exist.

PROVINCIAL LABORATORY. Special arrangements have been made with POLYTECHNIC SCHOOL of LAVAL UNIVERSITY, 228 ST. DENIS STREET, MONTREAL, for the determination, assays and analysis of minerals at very reduced rates for the benefit of miners and prospectors in the Province of Quebec. The well equipped laboratories of this institution and its trained chemists ensure results of undoubted integrity and reliability.

The Bureau of Mines at Quebec will give all the information desired in connection with the mines and mineral resources of the Province, on application addressed to

HONOURABLE J. E. PERRAULT,
MINISTER OF COLONIZATION, MINES AND FISHERIES, QUEBEC.

BRITISH COLUMBIA

The Mineral Province of Western Canada

Has produced Minerals valued as follows: Placer Gold, $75,722,603; Lode Gold, $100,272,431; Silver, $50,432,304; Lead, $43,821,106; Copper, $153,680,965; Zinc, $16,818,487; Coal and Coke, $199,123,323; Building Stone, Brick, Cement, etc., $29,991,757; Miscellaneous Minerals, $786,918; making its mineral production to the end of 1919 show an

Aggregate Value of $670,649,894

The substantial progress of the Mining Industry of this Province is strikingly exhibited in the following figures, which show the value of production for successive five-year periods: For all years to 1895, inclusive $94,547,241; for five years, 1896-1900, $57,605,967; for five years, 1901-1905, $96,509,968; for five years, 1906-1910, $125,534,474; for five years, 1911-1915, $142,072,603; for the year 1916, $42,290,462; for the year 1917, $37,010,392; for the year 1918, $41,782,474; for the year 1919, $33,296,313.

Production During last ten years, $322,829,310

Lode-mining has only been in progress for about twenty-five years, and not 20 per cent. of the Province has been even prospected; 300,000 square miles of unexplored mineral bearing land are open for prospecting.

The Mining Laws of this Province are more liberal and the fees lower than those of any other Province in the Dominion, or any Colony in the British Empire.

Mineral locations are granted to discoverers for nominal fees.

Absolute Titles are obtained by developing such properties, the security of which is guaranteed by Crown Grants.

Full information, together with Mining Reports and Maps, may be obtained gratis by addressing

THE HON. THE MINISTER OF MINES
VICTORIA, British Columbia

The Canadian Miners' Buying Directory.

Acetylene Gas:
Canada Carbide Company, Ltd.
Prest-O-Lite Co. of Canada, Ltd.

Acetylene Welding:
The Toronto Iron Works, Ltd.

A.C. Units:
MacGovern & Co
Powley & Townsley, Limited.

Agitators:
The Dorr Co.

Air Hoists:
Canadian Ingersoll-Rand Co., Ltd
Mussens, Limited.

Air Receivers:
The Toronto Iron Works, Ltd.

Alloy and Carbon Tool Steel:
International High Speed Steel Co., Rockaway, .
Peacock Brothers Limited.

Alternators:
MacGovern & Co.

Aluminium:
Spielman Agencies, Regd.

Amalgamators:
Northern Canada Supply Co.
Mine and Smelter Supply Co.
Wabi Iron Works.

Antimony:
Canada Metal Co.

Antimonial Lead:
Pennsylvania Smelting Co.

Arrester, Locomotive Spark:
Hendrick Manufacturing Co.

Assayers' and Chemists' Supplies:
Dominion Engineering & Inspection Co
Lymans, Limited
Mine & Smelter Supply Co.
Pennsylvania Smelting Co.
Stanley, W. F. & Co., Ltd.

Ash Conveyors:
Canadian Link-Belt Company

Ashes Handling Machinery:
Canadian Mead-Morrison Co., Limited
Canadian Link-Belt Co., Ltd.

Assayers and Chemists:
Milton L. Hersey Co., Ltd.
Campbell & Deyell
Ledoux & Co.
Thos. Heys & Son
C. L. Constant Co.

Asbestos:
Everitt & Co.

Balls:
Canadian Foundries and Forgings, Ltd
Hull Iron & Steel Foundries, Ltd.
Peacock Brothers Limited.
The Wabi Iron Works.
The Hardinge Conical Mill Co
The William Kennedy & Sons, Ltd.

Ball Mills:
Hardinge Conical Mill Co.
Hull Iron & Steel Foundries, Ltd
Mine and Smelter Supply Co.
The Wabi Iron Works.
The William Kennedy & Sons, Ltd.

Balances—Heusser:
Mine and Smelter Supply Co

Babbit Metals:
Canada Metal Co.
Hoyt Metal Co.

Ball Mill Feeders:
Hardinge Conical Mill Co.
Hull Iron & Steel Foundries, Ltd

Ball Mill Linings:
Hardinge Conical Mill Co
The William Kennedy & Sons, Ltd.
Peacock Brothers, Limited
Hull Iron & Steel Foundries, Ltd.

Belting—Leather, Rubber and Cotton:
Canadian Link-Belt Co., Ltd.
The Mine & Smelter Supply Co.
Northern Canada Supply Co.
Jones & Glasco.

Belting:
R. T. Gilman & Co.
Gutta Percha & Rubber, Ltd.

Belting—Silent Chain:
Canadian Link-Belt Co., Ltd.
Hans Renold of Canada, Limited, Montreal
Jones & Glassco (Regd.)

Belting (Transmission):
Goodyear Tire & Rubber Co

Belting (Elevator):
Goodyear Tire & Rubber Co.

Belting (Conveyor):
Goodyear Tire & Rubber Co
Gutta Percha & Rubber, Ltd.

Bins and Hoppers:
The Toronto Iron Works, Ltd.

Blasting Batteries and Supplies:
Canadian Ingersoll-Rand Co., Ltd
Mussens, Ltd.
Northern Canada Supply Co.
Canadian Explosives, Ltd.
Giant Powder Co. of Canada, Ltd.
Powley & Townsley, Limited.

Bluestone:
The Consolidated Mining & Smelting Co
The Conlagas Reduction Co., Ltd.

Blowers:
Canadian Fairbanks-Morse Co., Ltd
MacGovern & Co., Inc.
Northern Canada Supply Co.
Fraser & Chalmers of Canada, Ltd.

Boilers:
Northern Canada Supply Co.
Canadian Ingersoll-Rand Co., Ltd
Marsh Engineering Works
MacGovern & Co., Inc.
R. T. Gilman & Co.
Fraser & Chalmers of Canada, Ltd.
The John Inglis Company
Wabi Iron Works.

Blue Vitriol (Conlagas Reg):
Canadian Fairbanks-Morse Co., Ltd.

Bortz and Carbons:
Diamond Drill Carbon Co.

Boxes, Cable Junction:
Standard Underground Cable Co. of Canada, Ltd.
Northern Electric Co., Ltd.

Brazilian Rough Diamonds:
Diamond Drill Carbon Co.

Brazilian Mica:
Diamond Drill Carbon Co.

Buggies, Mine Car (Steel)
Hendrick Manufacturing Co

Brazilian Ballas:
Diamond Drill Carbon Co.

Brazilian Rock Crystal:
Diamond Drill Carbon Co.

Brazilian Tourmalines:
Diamond Drill Carbon Co.

Brazilian Aquamarines:
Diamond Drill Carbon Co.

Bridges—Man Trolley and Rope Operated—Material Handling:
Canadian Mead-Morrison Co., Limited

Bronze, Manganese, Perforated and Plain:
Hendrick Manufacturing Co.

Buckets:
Canadian Ingersoll-Rand Co., Ltd.
Canadian Mead-Morrison Co., Limited
The Electric Steel & Metals Co.
R. T. Gilman & Co.
Hendrick Manufacturing Co.
Canadian Link-Belt Co., Ltd.
Marsh Engineering Works
Mussens, Ltd.
MacKinnon Steel Co., Ltd.
Northern Canada Supply Co.
Fraser & Chalmers of Canada, Ltd.
The Wabi Iron Works

Buckets, Elevator:
Canadian Link-Belt Co., Ltd.
Hendrick Mfg. Co.
Peacock Brothers Limited.

Cable—Aerial and Underground:
Canada Wire & Cable Co.
Northern Canada Supply Co.
Standard Underground Cable Co. of Canada, Ltd
Peacock Brothers, Limited

Cableways:
Canadian Mead-Morrison Co., Limited
Fraser & Chalmers of Canada, Ltd.
Mussens, Ltd.
The Wabi Iron Works
R. T. Gilman & Co.

Cages:
Canadian Ingersoll-Rand Co., Ltd., Montreal, Que
Northern Canada Supply Co.
Fraser & Chalmers of Canada, Ltd.
The Electric Steel & Metals Co.
The Mine & Smelter Supply Co.
Mussens, Ltd.
The Wabi Iron Works

Canadian Miners' Buying Directory.—(Continued)

Cables—Wire:
Standard Underground Cable Co of Canada, Ltd.
Canada Wire & Cable Co.
Fraser & Chalmers of Canada, Ltd
Northern Electric Co., Ltd.
Osborn, Sam'l (Canada) Limited
R. T. Gilman & Co.

Cable Railway Systems:
Canada Wire & Cable Co.
Canadian Mead-Morrison Co., Limited

Cam Shafts:
Canada Foundries & Forgings, Ltd.
Hull Iron & Steel Foundries, Ltd.
Peacock Brothers Limited.

Car Dumps:
Sullivan Machinery Co.
R. T Gilman & Co.
Canadian Fairbanks-Morse Co., Ltd.
Canadian Mead-Morrison Co., Limited.

Carbide of Calcium:
Canada Carbide Company, Ltd.

Cars:
Canadian Foundries and Forgings, Ltd.
Canadian Ingersoll-Rand Co., Ltd.
Canadian Fairbanks-Morse Co., Ltd.
Canadian Mead-Morrison Co., Limited.
John J. Gartshore
MacKinnon Steel Co., Ltd.
The Electric Steel & Metals Co.
Northern Canada Supply Co.
Osborn, Sam'l (Canada) Limited.
Marsh Engineering Works
Mine and Smelter Supply Co.
Peacock Brothers, Limited
Fraser & Chalmers of Canada, Ltd
Mussens, Limited
Powley & Townsley, Limited.
R. T. Gilman & Co.

Car Wheels and Axles:
Canadian Car Foundry Co., Ltd.
Burnett & Crampton
Hull Iron & Steel Foundries, Ltd
John J. Gartshore
Marsh Engineering Works, Ltd.
Peacock Brothers Limited.
Osborn, Sam'l (Canada) Limited
The Electric Steel & Metals Co

Carriers (Gravity):
Jones & Glassco

Castings—Brass
The Canada Metal Co., Ltd.

Castings (Iron and Steel)
Canadian Steel Foundries, Ltd.
Hull Iron & Steel Foundries, Ltd
Peacock Brothers Limited.
The William Kennedy & Sons, Ltd.

Cement and Concrete Waterproofing:
Spielman Agencies, Regd.

Cement Machinery:
Northern Canada Supply Co.
Hadfields, Limited
Hull Iron & Steel Foundries, Ltd.
Osborn, Sam'l (Canada) Limited.
Fraser & Chalmers of Canada, Ltd
Canadian Fairbanks-Morse Co., Ltd
The Electric Steel & Metals Co.
R. T Gilman & Co.
Burnett & Crampton

Chains:
Jones & Glassco
Northern Canada Supply Co.
Canadian Fairbanks-Morse Co., Ltd
Canadian Link-Belt Co., Ltd.
Greening, B., Wire Co., Ltd.

Chain Drives:
Jones & Glassco (Regd.)

Chain Drives—Silent and Steel Roller:
Canadian Link-Belt Co., Ltd.
Hans Renold of Canada, Limited, Montreal Que

Chemical Apparatus:
Mine and Smelter Supply Co.
Powley & Townsley, Limited.

Chemists:
Canadian Laboratories
Campbell & Deyell
Thos. Heyes & Sons
Milton Hersey Co.
Ledoux & Co.
Constant, C. L. Company

Chrome Ore:
The Electric Steel & Metals Co.
Everett & Co.

Classifiers:
Mine and Smelter Supply Co.
Mussens, Limited
Fraser & Chalmers of Canada, Ltd
The Wabi Iron Works
R. T. Gilman & Co.
The Dorr Company

Clutches:
Canadian Link-Belt Co., Ltd.
Hans Renold of Canada, Limited, Montreal, Q

Coal:
Dominion Coal Co.
Nova Scotia Steel & Coal Co.

Coal Cutters:
Sullivan Machinery Co.
Canadian Ingersoll-Rand Co., Ltd
Peacock Brothers, Limited

Coal Crushers:
Canadian Mead-Morrison Co., Limited
Canadian Link-Belt Co., Ltd.
Peacock Brothers Limited.

Coal Mining Explosives:
Canadian Explosives, Ltd
Giant Powder Company of Canada, Ltd

Coal Mining Machinery:
Canadian Rock Drill Co.
Denver Rock Drill Mfg. Co., Ltd
Osborn, Sam'l (Canada) Limited
Canadian Ingersoll-Rand Co., Ltd.
Sullivan Machinery Co.
Marsh Engineering Works
Hadfields, Ltd.
Hendrick Mfg. Co.
Fraser & Chalmers of Canada, Limited
Powley & Townsley, Limited.
Mussens, Limited
R. T. Gilman & Co.

Coal and Coke Handling Machinery
Canadian Link-Belt Co., Ltd.
Powley & Townsley, Limited.

Coal Pockets:
Canadian Mead-Morrison Co., Limited

Coal Pick Machines:
Sullivan Machinery Co.

Coal Screening Plants:
Canadian Link-Belt Co., Ltd.
Canadian Mead-Morrison Co., Limited

Cobalt Oxide:
Coniagas Reduction Co.
Everitt & Co.

Compressors—Air:
Canadian Fairbanks-Morse Co., Ltd
Smart-Turner Machine Co.
Canadian Ingersoll-Rand Co., Ltd
Northern Canada Supply Co.
MacGovern & Co., Inc.
R. T. Gilman & Co.
Fraser & Chalmers of Canada, Ltd
Mussens, Limited
Peacock Brothers, Limited
The Mine & Smelter Supply Co

Concrete Mixers:
Canadian Fairbanks-Morse Co., Ltd
Northern Canada Supply Co.
Gould, Shapley & Muir Co., Ltd
MacGovern & Co., Inc
Mussens, Limited
R. T. Gilman & Co.

Condensers:
Canadian Fairbanks-Morse Co., Ltd
Smart-Turner Machine Co.
Northern Canada Supply Co.
MacGovern & Co., Inc.
Peacock Brothers, Limited

Concentrating Tables:
The Mine & Smelter Supply Co
Deister Concentrator Co.

Converters:
Northern Canada Supply Co.
MacGovern & Co., Inc.

Conveyors—McCaslin Gravity Bucket:
Canadian Mead-Morrison Co., Limited

Contractors' Supplies:
Canadian Fairbanks-Morse Co., Ltd.

Consultere and Engineers:
Hersey Milton Co., Ltd.

Conveyors:
Canadian Link-Belt Co., Ltd.
The Mine & Smelter Supply Co
Jones & Glassco (Regd.)
Powley & Townsley, Limited.

Conveyor Belts:
Gutta Percha & Rubber, Ltd.

Conveyor Flights:
Canadian Link-Belt Co., Ltd.
Hendrick Mfg. Co., Ltd.

Conveyor—Trough—Belt:
Canadian Fairbanks-Morse Co., Ltd
Canadian Link-Belt Co., Ltd.
Hendrick Mfg. Co
Mussens, Limited
Jones & Glassco (Roller, Belt and Chain)
Hendrick Mfg. Co.

Conical Mills:
Hardinge Conical Mill Co

Copper:
The Canada Metal Co., Ltd.
Consolidated Mining & Smelting Co.

Couplings:
Hans Renold of Canada, Limited, Montreal, Q

Cranes:
Canadian Fairbanks-Morse Co., Ltd.
Canadian Mead-Morrison Co., Limited.
Canadian Link-Belt Company
Peacock Brothers, Limited
R. T. Gilman & Co.
Smart-Turner Machine Co.

Crane Ropes:
Allan Whyte & Co.
Canada Wire & Cable Co.
Greening, B., Wire Co., Ltd.
Peacock Brothers, Limited

Crucibles:
Canadian Fairbanks-Morse Co., Ltd
The Mine & Smelter Supply Co.

Crusher Balls:
Canada Foundries & Forgings, Ltd.
Hull Iron & Steel Foundries, Limited, Hull, Que
Osborn, Sam'l (Canada) Limited.
Peacock Brothers, Limited
Swedish Steel & Importing Co., Ltd.

Crushers:
Canadian Fairbanks-Morse Co., Ltd
Canadian Steel Foundries, Ltd.
Hull Iron & Steel Foundries, Ltd.
Hardinge Conical Mill Co.
Lymans, Ltd.
Mussens, Limited
Osborn, Sam'l (Canada) Limited.
The Electric Steel & Metals Co., Ltd.
R. T. Gilman & Co.

Canadian Miners' Buying Directory.—(Continued)

The Mine & Smelter Supply Co.
Hadfields, Limited
The Wabi Iron Works

Cut Gears:
Hans Renold of Canada, Limited, Montreal, Q.

Cyanide:
American Cyanamid Company.

Cyanide Plant Equipment:
The Dorr Co.
The Mine & Smelter Supply Co.

D. C. Units:
MacGovern Co.
Powley & Townsley, Limited.

Derricks:
Smart-Turner Machine Co.
Marsh Engineering Works
R. T. Gilman & Co.
Canadian Fairbanks-Morse Co., Ltd
Mussens, Limited

Diamond Drill Contractors:
Diamond Drill Contracting Co
E. J. Longyear Company
Smith & Travers
Sullivan Machinery Co.

Diamond Tools:
Diamond Drill Carbon Co.

Diamond Importers:
Diamond Drill Carbon Co.

Digesters:
Canadian Chicago Bridge and Iron Works

Dies:
Canada Foundries & Forgings, Ltd.
Hull Iron & Steel Foundries, Ltd.

Dredger Pins:
Canadian Steel Foundries, Ltd.
Hull Iron & Steel Foundries, Ltd.
The Electric Steel & Metals Co.
Hadfields, Limited

Dredging Machinery:
Canadian Steel Foundries, Ltd.
Hadfields, Limited
Hull Iron & Steel Foundries, Ltd
R. T. Gilman & Co.

Dredging Ropes:
Allan, Whyte & Co.
Greening, B., Wire Co., Ltd.
R. T. Gilman & Co.

Drills, Air and Hammer:
Canadian Ingersoll-Rand Co., Ltd
Canadian Rock Drill Co.
Denver Rock Drill Mfg. Co., Ltd.
Sullivan Machinery Co.
Northern Canada Supply Co.
The Mine & Smelter Supply Co
Mussens, Limited

Drills—Core:
Canadian Ingersoll-Rand Co., Ltd
E. J. Longyear Company
Standard Diamond Drill Co.
Sullivan Machinery Co.

Drills—Diamond:
Sullivan Machinery Co.
Northern Canada Supply Co
E. J. Longyear Company

Drill Steel Furnaces:
Sullivan Machinery Co.

Drill Steel—Mining:
H. A. Drury Co., Ltd
Hadfields, Limited
International High Speed Steel Co., Rock
Mussens, Limited
Swedish Steel & Importing Co., Ltd

Drill Steel Sharpeners:
Canadian Ingersoll-Rand Co., Ltd
Canadian Rock Drill Co.
Denver Rock Drill Mfg. Co., Ltd
Northern Canada Supply Co.
Sullivan Machinery Co.
The Wabi Iron Works

Drills—Electric:
Canadian Fairbanks-Morse Co., Ltd
Sullivan Machinery Co.
Northern Electric Co., Ltd.

Drills—High Speed and Carbon:
Canadian Fairbanks-Morse Co., Ltd
H. A. Drury Co., Ltd.
Hadfields, Limited

Dynamite:
Canadian Explosives
Giant Powder Company of Canada, Ltd
Northern Canada Supply Co.

Dynamos:
Canadian Fairbanks-Morse Co., Ltd.
MacGovern & Company
Powley & Townsley, Limited.

Ejectors:
Canadian Ingersoll-Rand Co., Ltd
Northern Canada Supply Co

Electric Welding:
The Toronto Iron Works, Ltd.

Elevators:
Canadian Link-Belt Co., Ltd.
Sullivan Machinery Co.
Northern Canada Supply Co.
Hadfields, Limited
Jones & Glassco (Regd.)
Mussens, Limited
The Wabi Iron Works

Engineering Instruments:
C. L. Berger & Sons

Engines—Gas and Gasoline:
Fraser & Chalmers of Canada, Ltd
Sullivan Machinery Co.
Gould, Shapley & Muir Co., Ltd.
MacGovern & Co., Inc.
The Mine & Smelter Supply Co

Engines—Haulage:
Canadian Ingersoll-Rand Co., Ltd., Mont.
Marsh Engineering Works
Powley & Townsley, Limited.

Engines—Marine:
MacGovern & Co., Inc.

Engines—Steam:
R. T. Gilman & Co.
MacGovern & Co., Inc.

Engineers:
General Engineering Co., New York
The Dorr Co.

Ferro-Alloys (all Classes):
Everitt & Co.

Feed Water Heaters:
MacGovern & Co.

Fire Fighting Supplies:
Gutta Percha & Rubber, Ltd

Flashlights—Electric:
Powley & Townsley, Limited.

Flood Lamps:
Northern Electric Co., Ltd.

Flourspar:
The Consolidated Mining & Smelting Co.
Everitt & Co.

Forges:
Northern Canada Supply Co.

Forging:
Canadian Foundries and Forgings, Ltd.
Hull Iron & Steel Foundries, Ltd.
Smart-Turner Machine Co.
Hadfields, Limited

Frogs:
Hull Iron & Steel Foundries, Ltd
John J. Gartshore

Frequency Changers:
MacGovern & Co., Inc.

Furnaces—Assay:
Lymans, Limited
Mine & Smelter Supply Co

Fuse:
Canadian Explosives
Northern Canada Supply Co

Gasoline Tanks:
The Toronto Iron Works, Ltd

Gaskets:
Gutta Percha & Rubber, Ltd.

Gears:
Hans Renold of Canada, Limited, Montreal, Q.
Jones & Glassco (Regd.)

Gears (Cast):
Hull Iron & Steel Foundries, Ltd.
Canadian Link-Belt Co., Ltd.

Gears, Machine Cut:
Canadian Steel Foundries, Ltd.
The Hamilton Gear & Machine Co.
The Wabi Iron Works

Granulators:
Hardinge Conical Mill Co.

Gold Refiners
Goldsmith Bros

Canadian Miners' Buying Directory.—(Continued)

Gold Trays.
Canada Chicago Bridge & Iron Works

Hose (Air Drill):
Goodyear Tire & Rubber Co.
Gutta Percha & Rubber, Ltd.

Hose (Fire):
Goodyear Tire & Rubber Co.
Gutta Percha & Rubber, Ltd.

Hose (Packings)
Goodyear Tire & Rubber Co.
Gutta Percha & Rubber, Ltd.

Hose (Suction):
Goodyear Tire & Rubber Co.
Gutta Percha & Rubber, Ltd.

Hose (Steam):
Goodyear Tire & Rubber Co.
Gutta Percha & Rubber, Ltd

Hose (Water):
Goodyear Tire & Rubber Co.
Gutta Percha & Rubber, Ltd.

Hammer Rock Drills:
Canadian Rock Drill Co.
Denver Rock Drill Mfg. Co., Ltd.
Osborn, Sam'l (Canada) Limited.
Mussens, Limited
The Mine & Smelter Supply Co.

Hangers and Cable:
Standard Underground Cable Co. of Canada, Ltd

High Speed Steel:
Canadian Fairbanks-Morse Co. Ltd.
H. A. Drury Co., Ltd.
Hadfields, Limited
International High Speed Steel Co., Rockaway,

High Speed Steel Twist Drills:
H. A. Drury Co., Ltd.
Northern Canada Supply Co.
Osborn, Sam'l (Canada) Limited.

Hoists—Air, Electric and Steam:
Canadian Ingersoll-Rand Co., Ltd.
Canadian Rock Drill Co.
Denver Rock Drill Mfg. Co., Ltd.
Jones & Glassco
Marsh Engineering Works
Northern Canada Supply Co.
Mine & Smelter Supply Co.
The Wabi Iron Works
R. T. Gilman & Co.
Mussens, Limited
Canadian Link-Belt Co., Ltd.

Hoisting Engines:
Canadian Rock Drill Co.
Denver Rock Drill Mfg. Co., Ltd.
Mussens, Limited
Peacock Brothers, Limited
Sullivan Machinery Co.
Canadian Ingersoll-Rand Co., Ltd.
Marsh Engineering Works
The Mine & Smelter Supply Co

Hose:
Gutta Percha & Rubber, Ltd
Northern Canada Supply Co

Hose (Steam, Air, Water):
Gutta Percha & Rubber, Ltd.

Hydraulic Machinery:
Canadian Fairbanks-Morse Co., Ltd
Hadfields, Limited
MacGovern & Co., Inc.
The Wabi Iron Works

Oil Storage Tanks:
The Toronto Iron Works, Ltd.

Industrial Chemists:
Hersey, M. & Co., Ltd.

Ingot Copper:
Canada Metal Co., Ltd

Insulating Compounds:
Standard Underground Cable Co. of Canada, Ltd

Inspection and Testing:
Dominion Engineering & Inspection Co

Inspectors:
Hersey, M. & Co., Ltd.

Jacks:
Can. Brakeshoe Co., Ltd.
Northern Canada Supply Co
R. T. Gilman & Co.
Mussens, Limited

Jack Screws:
Canadian Foundries and Forgings Ltd

Lamps—Acetylene:
Dewar Manufacturing Co., Inc

Lamps—Carbide:
Dewar Manufacturing Co., Inc

Lamps—Miners:
Canada Carbide Company, Limited
Canadian Fairbanks-Morse Co., Ltd
Dewar Manufacturing Co., Inc.
Northern Electric Co., Ltd.
Mussens, Limited
Peacock Brothers, Limited
Powley & Townsley, Limited.

Lamps:
Dewar Manufacturing Co., Inc
Powley & Townsley, Limited.

Lanterns—Electric:
Spielman Agencies, Regd.
Powley & Townsley, Limited.

Lead (Pig):
The Canada Metal Co., Ltd.
Consolidated Mining & Smelting Co
Hoyt Metal Company.

Levels:
C. L. Berger & Sons

Locomotives (Steam, Compressed Air and Storage :
Canadian Fairbanks-Morse Co., Ltd.
R. T. Gilman & Co
Mancha Storage Battery Locomotive Co.
Mussens, Limited
Powley & Townsley, Limited.

Link Belt
Canadian Fairbanks-Morse Co Ltd
Canadian Link-Belt Co., Ltd.
Northern Canada Supply Co.
Jones & Glassco

Machinists:
Burnett & Crampton

Machinery—Repair Shop:
Canadian Fairbanks-Morse Co., Ltd

Machine Shop Supplies:
Canadian Fairbanks-Morse Co., Ltd

Magnesium Metal:
Everitt & Co.
Hull Iron & Steel Foundries, Ltd

Manganese Steel:
Canadian Steel Foundries, Ltd.
Hadfields, Limited
Osborn, Sam'l (Canada) Limited.
Hull Iron & Steel Foundries, Ltd.
Fraser & Chalmers of Canada, Ltd
The Wabi Iron Works

Metal Marking Machinery:
Canadian Fairbanks-Morse Co., Ltd.

Metal Merchants:
Henry Bath & Son
Geo. G. Blackwell, Sons & Co.
Conlagas Reduction Co.
Consolidated Mining & Smelting Co. of Canada
Canada Metal Co.
C. L. Constant Co.
Everitt & Co
Hoyt Metal Company.

Metallurgical Engineers:
General Engineering Co., New York
The Dorr Co.

Metallurgical Machinery:
General Engineering Co., New York
Dwight & Lloyd Sintering Co., Inc.
The Dorr Co.
The Mine & Smelter Supply Co.

Metal Work, Heavy Plates:
Canada Chicago Bridge & Iron Works

Mica:
Everitt & Co.
Diamond Drill Carbon Co.

Mining Engineers:
Hersey, M. Co., Ltd.

Mining Drill Steel:
H. A. Drury Co., Ltd.
Hadfields, Limited

International High Speed Steel Co., Rockaway, N

Mining Requisites:
Dominion Wire Rope Co., Ltd.
Hadfields, Limited
Hull Iron & Steel Foundries, Ltd.
Powley & Townsley, Limited.

Mining Ropes:
Dominion Wire Rope Co., Ltd
Peacock Brothers, Limited

Mine Surveying Instruments:
C. L. Berger & Sons

Molybdenite:
Everitt & Co

Monel Metal (Wire, Rod, Sheet and Foundry Metal):
International Nickel Co.

Motors:
Canadian Fairbanks-Morse Co., Ltd
R. T. Gilman & Co.
MacGovern & Co.
The Mine & Smelter Supply Co.
The Wabi Iron Works

Canadian Miners' Buying Directory.—(Continued)

Motor Generator Sets—A.C. and D.C.
MacGovern & Co.
Powley & Townsley, Limited.

Nails:
Canada Metal Co.

Nickel:
International Nickel Co
Conlagas Reduction Co.
The Mond Nickel Co., Ltd

Nickel Anodes:
The Mond Nickel Co., Ltd.

Nickel Salts:
The Mond Nickel Co., Ltd.

Nickel Sheets:
The International Nickel Co. of Canada
The Mond Nickel Co., Ltd.

Nickel Wire:
The Mond Nickel Co., Ltd.
The International Nickel Co. of Canada

Oil Analysts:
Constant, C. L. Co.

Ore Handling Equipment:
Canadian Link-Belt Co., Ltd.
Powley & Townsley, Limited.

Ore Sacks:
Northern Canada Supply Co.

Ore Testing Works:
Ledoux & Co.
Can. Laboratories
Milton Hersey Co.
Campbell & Deyell
General Engineering Co., New York
Hoyt Metal Co.

Ores and Metals—Buyers and Sellers of:
C. L. Constant Co.
Geo. G. Blackwell
Consolidated Mining and Smelting Co. of Canada
Oxford Copper Co.
Canada Metal Co.
Everitt & Co.
Pennsylvania Smelting Co.

Packing:
Gutta Percha & Rubber, Ltd.

Paints—Special:
Spielman Agencies, Regd.

Perforated Metals:
Northern Canada Supply Co.
Hendrick Mfg. Co.
Canada Wire and Iron Goods Company.
Greening, B., Wire Co.

Pig Tin:
Canada Metal Co., Ltd.
Hoyt Metal Co.

Pig Lead:
Canada Metal Co., Ltd.
Hoyt Metal Co.
Pennsylvania Manufacturing Co.

Pillow Blocks:
Canadian Link-Belt Company

Pipes:
Canada Metal Co., Ltd.
Consolidated M. & S. Co.
Northern Canada Supply Co.
R. T. Gilman & Co.

Pipe Fittings:

Pipe—Wood Stave:
Pacific Coast Pipe Co.
Mine & Smelter Supply Co

Piston Rock Drills:
Mussens, Limited
Mine & Smelter Supply Co

Plate Works:
John Inglis Co., Ltd
Hendrick Mfg. Co.
The Wabi Iron Works
MacKinnon Steel Co., Ltd

Platinum Refiners:
Goldsmith Bros.

Pneumatic Tools:
Canadian Ingersoll-Rand Co., Ltd
R. T. Gilman & Co

Pneumatic Water Supply Tanks:
The Toronto Iron Works, Ltd.

Prospecting Mills and Machinery:
E. J. Longyear Company
Standard Diamond Drill Co.
The Wabi Iron Works
Mine & Smelter Supply Co

Pumps—Pneumatic:
Smart-Turner Machine Co
Sullivan Machinery Co

Pumps—Steam:
Canadian Fairbanks-Morse Co., Ltd.
Canadian Ingersoll-Rand Co., Ltd.
The Electric Steel & Metals Co.
The Mine & Smelter Supply Co.
Mussens, Limited
Northern Canada Supply Co
Smart-Turner Machine Co
Peacock Brothers, Limited
R. T. Gilman & Co.
Fraser & Chalmers of Canada, Ltd
The Wabi Iron Works

Pumps—Turbine:
Canadian Fairbanks-Morse Co., Ltd
Smart-Turner Machine Co.
Canadian Ingersoll-Rand Co., Ltd.
Fraser & Chalmers of Canada, Ltd.
Peacock Brothers, Limited
The Wabi Iron Works

Pumps—Vacuum:
Canadian Fairbanks-Morse Co., Ltd
Smart-Turner Machine Co.
Peacock Brothers, Limited
The Wabi Iron Works

Pumps—Valves:
Canadian Fairbanks-Morse Co., Ltd
Peacock Brothers, Limited

Pulleys, Shaftings and Hangings:
Northern Canada Supply Co.
Canadian Fairbanks-Morse Co., Ltd
The Wabi Iron Works

Pulverizers—Laboratory:
Mine & Smelter Supply Co
The Wabi Iron Works
Hardinge Conical Mill Co.

Pumps—Boiler Feed:
Smart-Turner Machine Co.
Northern Canada Supply Co.
Canadian Fairbanks-Morse Co., Ltd
Fraser & Chalmers of Canada, Ltd.
Peacock Brothers, Limited
Mussens, Limited
Mine & Smelter Supply Co.

Pumps—Centrifugal:
Canadian Fairbanks-Morse Co., Ltd.
The Electric Steel & Metals Co.
Smart-Turner Machine Co.
Canadian Mead-Morrison Co., Limited.
Canadian Ingersoll-Rand Co., Ltd.
Mine & Smelter Supply Co.
Peacock Brothers, Limited
Fraser & Chalmers of Canada, Ltd.
The Wabi Iron Works

Pumps—Diaphragm
The Dorr Company

Pumps—Electric
Mussens, Limited
Peacock Brothers, Limited
Smart-Turner Machine Co.

Pumps—Sand and Slime:
Mine & Smelter Supply Co.
Peacock Brothers, Limited
The Electric Steel & Metals Co
The Wabi Iron Works
Smart-Turner Machine Co.

Quarrying Machinery:
Canadian Rock Drill Co.
Denver Rock Drill Mfg. Co., Ltd.
Sullivan Machinery Co.
Canadian Ingersoll-Rand Co., Ltd
Hadfields, Limited
Mussens, Limited
R. T. Gilman Co.

Rails:
Hadfields, Limited
John J. Gartshore
R. T. Gilman & Co.
Mussens, Limited

Refiners:
Goldsmith Bros.

Riddles:
Hendrick Mfg. Co

Roller Chain:
Hans Renold of Canada, Limited, Montreal, Que
Canadian Link-Belt Co., Ltd.

Roofing:
Northern Canada Supply Co.

Rope—Manilla:
Mussens, Limited

Rope—Manilla and Jute:
Jones & Glassco
Northern Canada Supply Co
Allan Whyte & Co
Peacock Brothers, Limited

Canadian Miners' Buying Directory.—(Continued)

Rope—Wire:
Allan, Whyte & Co., Ltd.
Canada Wire & Cable Co.
Canada Wire & Iron Goods Co.
Dominion Wire Rope Co., Ltd.
Greening, B. Wire Co.
Northern Canada Supply Co.
Mussens, Limited

Rolls—Crushing
Canadian Steel Foundries, Ltd.
Fraser & Chalmers of Canada, Ltd.
Hull Iron & Steel Foundries, Ltd.
Osborn, Sam'l (Canada) Limited.
Hadfields, Limited
The Electric Steel & Metals Co.
Mussens, Limited
The Wabi Iron Works

Samplers:
Fraser & Chalmers of Canada, Ltd.
C. L. Constant Co.
Ledoux & Co.
Milton Hersey Co.
Thos. Heyes & Son
Mine & Smelter Supply Co
Mussens, Limited

Scales—(all kinds):
Canadian Fairbanks-Morse Co., Ltd

Screens:
Greening, B. Wire Co.
Hendrick Mfg. Co.
Mine & Smelter Supply Co.
Canada Wire and Iron Goods Company.
Canadian Link-Belt Co., Ltd.

Screens—Cross Patent Flanged Lip:
Hendrick Mfg. Co.

Screens—Perforated Metal:
Hendrick Mfg. Co.

Screens—Shaking:
Canadian Link-Belt Co., Ltd
Hendrick Mfg. Co.

Screens—Revolving:
Canadian Link-Belt Co., Ltd.
Hendrick Mfg. Co.

Scheelite:
Everitt & Co.

Separators:
Canadian Fairbanks-Morse Co., Ltd
Smart-Turner Machine Co.
Mine & Smelter Supply Co.

Shaft Contractors:
Hendrick Mfg. Co

Sheet Metal Work:
Hendrick Mfg. Co.

Sheets—Genuine Manganese Bronze:
Hendrick Mfg. Co.

Shoes and Dies:
Canadian Foundries and Forgings, Ltd.
H. A. Drury Co., Ltd.
Fraser & Chalmers of Canada, Ltd.
Hull Iron & Steel Foundries, Ltd.
Peacock Brothers Limited.
The Electric Steel & Metals Co.
The Wabi Iron Works

Shovels—Steam:
Canadian Foundries and Forgings, Ltd
Canadian Mead-Morrison Co., Limited.
Osborn, Sam'l (Canada) Limited.
R. T. Gilman & Co.

Ship Bunkering Equipment:
Canadian Mead-Morrison Co., Limited.

Silent Chain:
Canadian Link-Belt Co., Ltd.
Hans Renold of Canada, Limited, Montreal, Que

Silent and Steel Roller:
Canadian Link-Belt Co., Ltd.
Jones & Glassco (Regd.)

Silver:
Coniagas Reduction Co.

Saline Refiners:
Goldsmith Bros.

Smelters:
Goldsmith Bros.

Sledges:
Canada Foundries & Forgings, Ltd.

Sintering:
Dwight & Lloyd Sintering Co., Inc.

Smoke Stacks:
Hendrick Mfg. Co.
MacKinnon Steel Co., Ltd
Marsh Engineering Works
The Wabi Iron Works

Solder—Bar and Wire:
Hoyt Metal Company

Special Machinery:
John Inglis Co., Ltd.

Spelter:
The Canada Metal Co., Ltd.
Consolidated Mining & Smelting Co.

Sprockets:
Hans Renold of Canada, Limited, Montreal, Que
Canadian Link-Belt Co., Ltd.
Jones & Glassco (Regd.)

Spring Coil and Clips Electric:
Canadian Steel Foundries, Ltd

Steel Barrels:
Smart-Turner Machine Co.
Fraser & Chalmers of Canada, Ltd

Stamp Forgings:
Canada Foundries & Forgings, Ltd.
Hull Iron & Steel Foundries, Ltd.

Steel Castings:
Canadian Brakeshoe Co., Ltd.
Hull Iron & Steel Foundries, Ltd.
Hadfields, Limited
The Wabi Iron Works
The William Kennedy & Sons, Ltd.

Steel Drills:
Canadian Fairbanks-Morse Co., Ltd
Canadian Rock Drill Co.
Denver Rock Drill Mfg. Co., Ltd.
Sullivan Machinery Co.
Northen Canada Supply Co.
The Electric Steel & Metals Co.
Osborn, Sam'l (Canada) Limited.
Peacock Brothers Limited.
Canadian Ingersoll-Rand Co., Ltd
Mussens, Limited
Swedish Steel & Importing Co., Ltd

Steel Drums:
Smart-Turner Machine Co.

Steel—Tool:
Canadian Fairbanks-Morse Co., Ltd
H. A. Drury Co., Ltd.
N. S. Steel & Coal Co.
Osborn, Sam'l (Canada) Limited.
Hadfields, Limited
Swedish Steel & Importing Co., Ltd

Structural Steel Work (Light):
Hendrick Mfg. Co.

Stone Breakers:
Hadfields, Limited
Fraser & Chalmers of Canada, Ltd
The Electric Steel & Metals Co.
Mussens, Limited
R. T. Gilman & Co.
The Wabi Iron Works

Storage Battery Locomotives:
Mancha Storage Battery Locomotive Co.
Powley & Townsley, Limited.

Sulphate of Copper:
The Mond Nickel Co., Ltd
Coniagas Reduction Co.

Sulphate of Nickel:
The Mond Nickel Co., Ltd

Surveying Instruments:
C. L. Berger

Switches and Switch Stand:
Mussens, Limited.

Switches and Turntables:
John J. Gartshore

Tables—Concentrating:
Mine & Smelter Supply Co.

Tanks:
R. T. Gilman & Co.

Tanks—Acid:
Canadian Chicago Bridge & Iron Works
The Mine & Smelter Supply Co.

Tanks (Wooden):
Gould, Shapley & Muir Co., Ltd.
Pacific Coast Pipe Co., Ltd.

Tanks—Cyanide, Etc.:
Hendrick Mfg. Co.
Pacific Coast Pipe Co
MacKinnon Steel Co.

Tanks—Steel:
Canadian Ingersoll-Rand Co., Ltd.
Canadian Chicago Bridge & Iron Works
Marsh Engineering Works
MacKinnon Steel Co.
Hendrick Mfg. Co.

Tanks—Oil Storage:
Canadian Chicago Bridge & Iron Works
The Mine & Smelter Supply Co.

Tanks—Water and Steel Towers:
Canadian Chicago Bridge & Iron Works
MacKinnon Steel Co.

Tires—Auto, Truck and Bicycle:
Gutta Percha & Rubber, Ltd

Canadian Miners' Buying Directory.—(Continued)

Tramway Points and Crossings:
Canadian Steel Foundries, Ltd.
Hadfields, Limited

Transits:
C. L. Berger & Sons

Transformers:
Canadian Fairbanks-Morse Co., Ltd
R. T. Gilman & Co.
Northern Electric Co., Ltd.

Transmission Appliances:
Jones & Glassco (Regd.)

Transmission Machinery:
Canadian Link-Belt Co., Ltd.
Hans Renold of Canada, Limited, Montreal, Que
Jones & Glassco (Regd.)

Troughs (Conveyor):
Hendrick Manufacturing Co.

Trucks—Electric:
Canadian Fairbanks-Morse Co., Ltd.
Powley & Townsley, Limited.

Trucks—Hand:
Canadian Fairbanks-Morse Co., Ltd.

Trucks:
Powley & Townsley, Limited.
Canadian Fairbanks-Morse Co., Ltd

Tubs:
Hadfields, Limited

Tube Mills:
Hardinge Conical Mill Co.
The William Kennedy & Sons, Ltd.

Tube Mill Balls:
Canada Foundries & Forgings, Ltd
Hull Iron & Steel Foundries, Ltd.
Peacock Brothers Limited
The William Kennedy & Sons, Ltd.

Tube Mill Liners:
Hull Iron & Steel Foundries, Ltd
Peacock Brothers Limited.
The William Kennedy & Sons, Ltd.

Turbines—Water Wheel:
The William Kennedy & Sons, Ltd.

Turbines—Steam:
Fraser & Chalmers of Canada, Ltd
MacGovern & Co.

Twincones:
Canada Foundries & Forgings, Ltd.

Uranium:
Everitt & Co.

Vacuum Pumps:
Sullivan Machinery Co.

Weighing Larries:
Canadian Mead-Morrison Co., Limited

Welding—Rod and Flux:
Prest-O-Lite Co. of Canada, Ltd.
Imperial Brass Mfg. Co.

Welding and Cutting—Oxy-Acetylene:
Prest-O-Lite Co. of Canada, Ltd.
Canadian Fairbanks-Morse Co., Ltd

Wheels and Axles:
Hadfields, Limited

White Arsenic:
The Coniagas Reduction Co., Ltd.

Winches—Power Driven:
Canadian Mead-Morrison Co., Limited

Winding Engines—Steam and Electric:
Canadian Fairbanks-Morse Co., Ltd
Canadian Ingersoll-Rand Co., Ltd
Marsh Engineering Works
Fraser & Chalmers of Canada, Ltd
Mussens, Limited
R. T. Gilman & Co.

Wire:
Canada Wire & Cable Co., Ltd
Greening, B. Wire Co.

Wire—Bare and Insulated:
Canada Wire & Cable Co.

Wire Rope:
Allan, Whyte & Co., Ltd.
R. T. Gilman & Co
Canada Wire and Iron Goods Company
Dominion Wire Rope Co., Ltd

Wire Rope Fittings:
Canada Wire and Iron Goods Company

Wire Cloth:
Northern Canada Supply Co
Greening, B. Wire Co.
Canada Wire & Iron Goods Company

Wire (Bars and Insulated):
Standard Underground Cable Co of Canada, Ltd
Northern Electric Co., Ltd.

Wolfram Ore:
Everitt & Co.

Woodworking Machinery:
Canadian Fairbanks-Morse Co., Ltd

Zirconium:
Everitt & Co.

Zinc:
The Canada Metal Co., Ltd
Consolidated Mining & Smelting Co

Zinc Spelter:
Canada Metal Co., Ltd
Hoyt Metal Co., Ltd

Advertisements other than "Employment Wanted" or "Employees Wanted" will be inserted in this department at the rate of 20 cents per agate line (14 agate lines make one inch). $2.80 per inch, each insertion, payable in advance. Space measured from rule to rule. When four or more consecutive insertions of the same advertisement are ordered a discount of 25 per cent. will be allowed.

Advertisements of "Wanted Employment" or "Wanted Employees" will be inserted at the rate of two cents a word, net. Cash must accompany order. If box number is used, enclose ten cents extra for postage in forwarding replies. Minimum charge 50 cents.

ELECTRIC STORAGE BATTERY LOCOMOTIVES FOR SALE, Two, 36 inch Gauge. Complete and in good condition. R. T. Gilman & Company, Dept. "R" 211 McGill Street, Montreal.

FELDSPAR PROPERTY FOR SALE—One hundred acres situated in Eastern Ontario. Considerable development work has been done. Government assay shows spar of good quality. This property can be economically worked and is convenient to railroad. For further particulars apply P. M. Lewis, 816 College St., Toronto, Ont.

ALPHABETICAL INDEX TO ADVERTISERS