

# CANADIAN MINING JOURNAL

Vol. XLI.

Gardenvale, P.Q., November 26, 1920.

No. 47.



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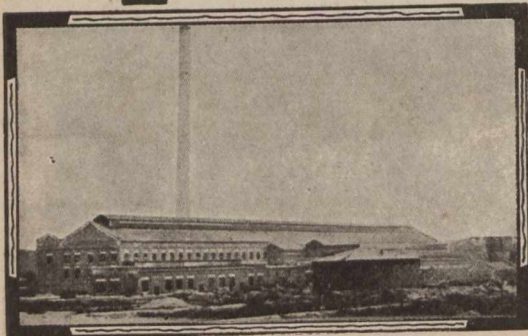
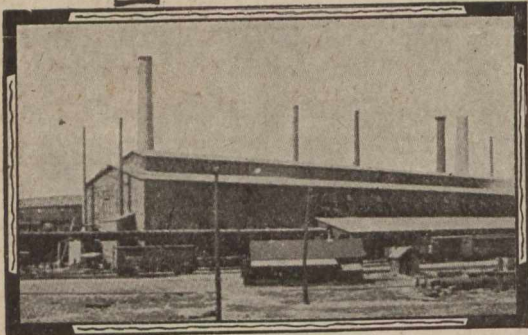
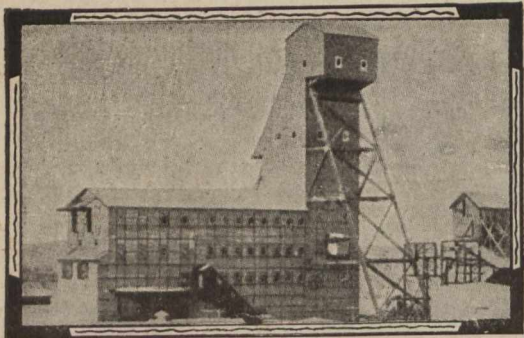
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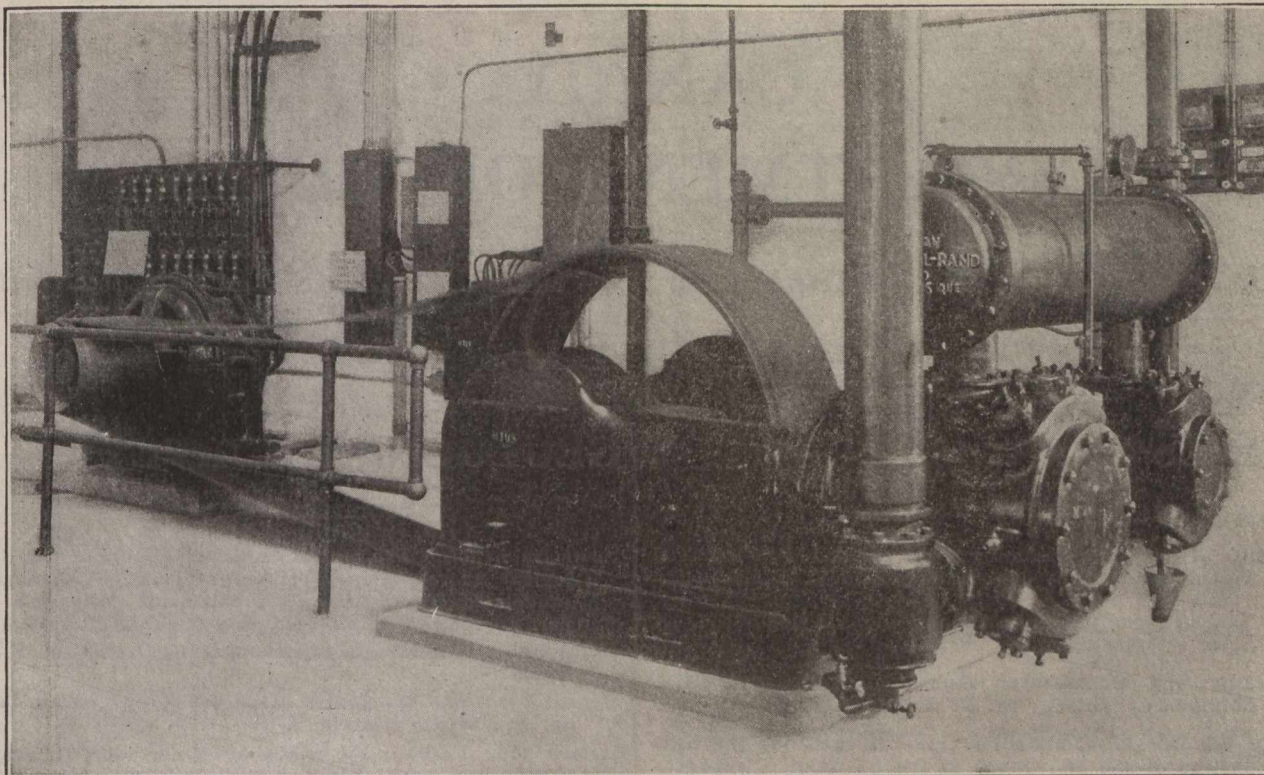
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## DEPARTMENT OF MINES

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CHARLES CAMSELL, *Deputy Minister*

### MINES BRANCH

#### Recent Publications

- Results of forty-one Steaming Tests conducted at the Fuel Testing Station, by John Blizard and E. S. Malloch.
- The Copper Smelting Industry of Canada. Report on, by A. W. G. Wilson, Ph.D.
- Building and Ornamental Stones of Canada (British Columbia). Vol. V., by W. A. Parks, Ph.D.
- Peat, Lignite and Coal; their value as fuels for the production of gas and power in the by-product, recovery producer. Report on, by B. F. Haanel, B.Sc.
- 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, 1918.
- 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 105. Amisk-Athapapuskow Lake district, by E. L. Bruce.
- Memoir 108. The Mackenzie River basin, by Charles Camsell and Wyatt Malcolm.
- Memoir 110. Preliminary report on the economic geology of Hazelton district, British Columbia, by J. J. O'Neill.
- 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 117. Geology and ore deposits of Ainsworth mining camp, British Columbia, by S. J. Schofield.
- Museum Bulletin 30. Gabbros of East Sooke and Rocky Point, by H. C. Cooke.
- Map 164A. St. John, New Brunswick. Topography.
- Map 183A. Harricanaw-turgeon basin; Abitibi, Timiskaming and Pontiac, Que. Geology.
- 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 1712. Foothills of Southern Alberta, St. Mary river to Hig:wood river. Geology.
- Map 1724. Sheep River, Alberta. Geology.
- Map 1726. Athapapuskow Lake region. Geology.
- Map 1739. Portions of Bristol, Onslow, McNab, Fitzroy and Torbolton townships, Quebec and Ontario. Geology.
- Map 1742. Ainsworth, Kootenay district, B.C. Geology.
- Map 1793. Matachewan, Timiskaming district, Ontario. 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.

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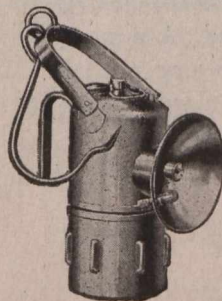
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PROVINCE OF ONTARIO  
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HON. H. MILLS, Minister of Mines.

# Ontario's Mining Lands

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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.

Practically all metals and economic minerals (with the exception of coal and tin) are found in Ontario:—actinolite, apatite, arsenic, asbestos, cobalt, corundum, feldspar, fluor-spar, 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, meet every demand. Lime, Portland cement, brick and tile are largely manufactured.

Ontario in 1919 produced 38 per cent. of the total mineral output of Canada. Returns show the output of the mines and mineralogical works of the Province for the year 1919 to be worth \$58,583,916, of which the metallic production was \$41,590,759.

Dividends and bonuses paid to the end of 1919 amounted to \$15,545,238 for gold mining companies, and \$78,335,943 for silver mining companies, or a total of \$93,881,181.

The prospector can go almost anywhere in the mineral regions in his canoe; the climate is invigorating and healthy, and there is plenty of wood and good water. Hydro-electric power is abundant, and many undeveloped water-powers remain to be harnessed. 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 240 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.

For list of publications, illustrated reports, geological maps and mining laws, apply to

**Thos. W. Gibson,**

Deputy Minister of Mines,

Toronto, Canada

# To Manufacturers

Valuable economic minerals, of which the people of this country as a rule have little knowledge, are distributed in various sections served by the Canadian National Railways. The field of utility for these minerals is constantly expanding and entering more and more into the realm of manufacture.

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**The Industrial and Resources  
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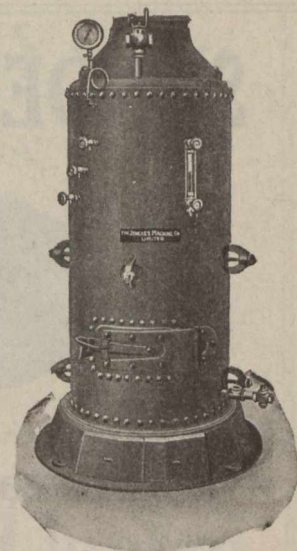
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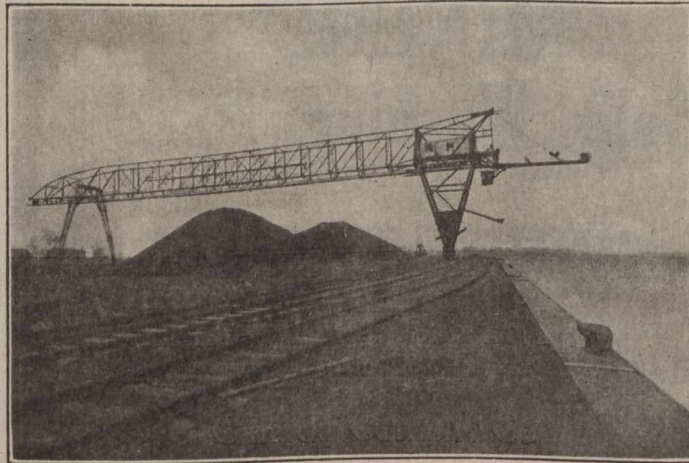
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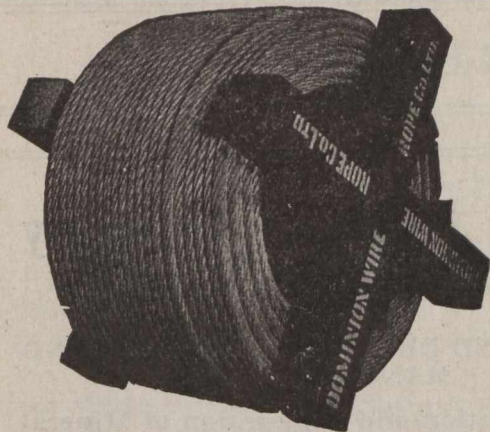
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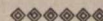
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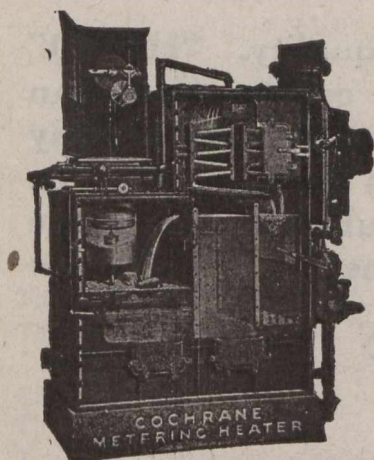
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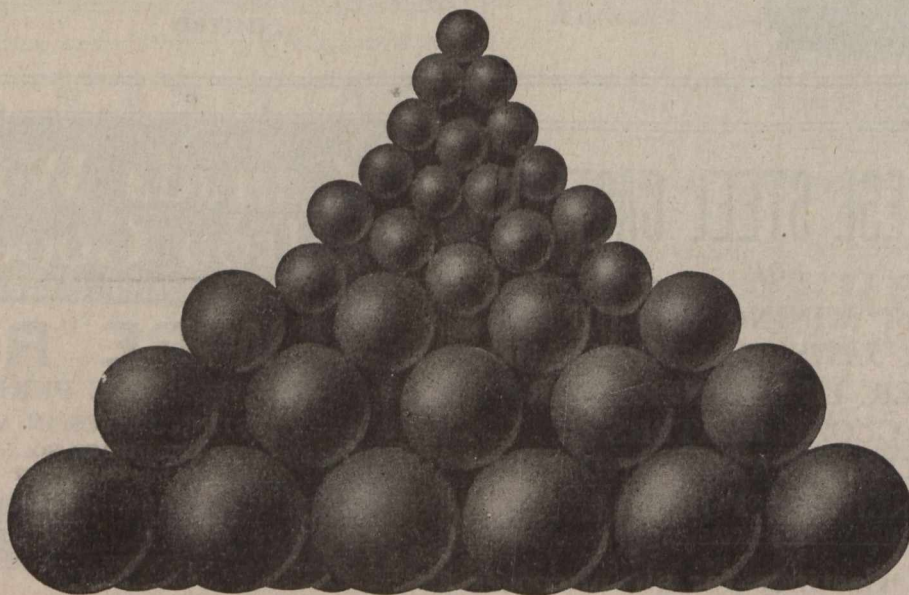
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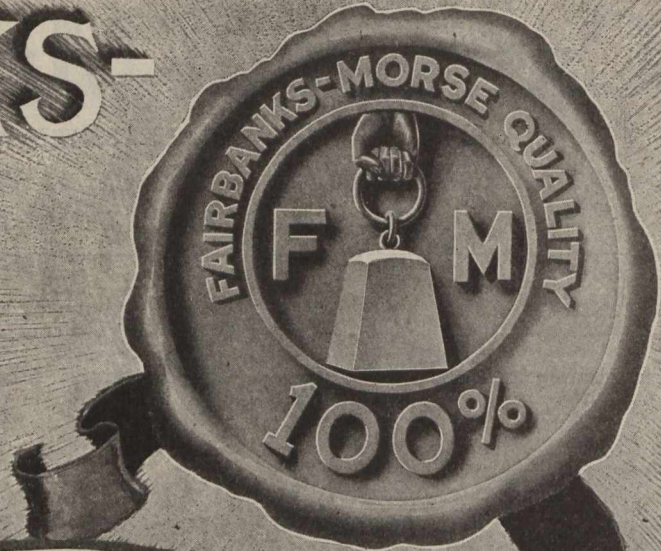
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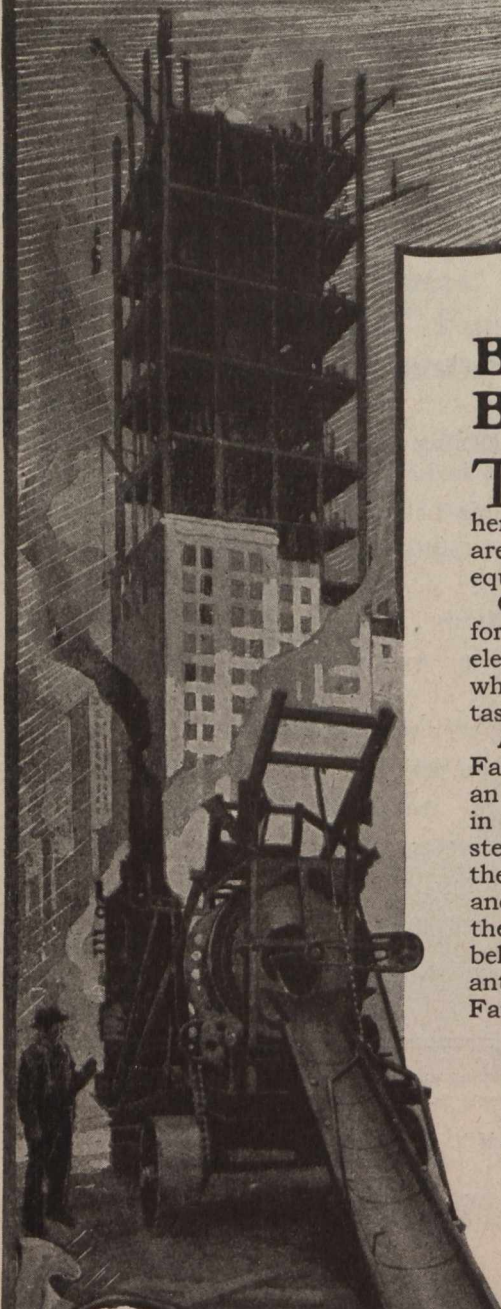
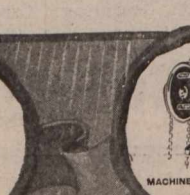
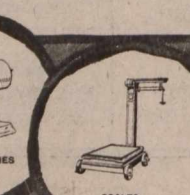
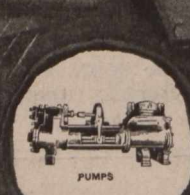
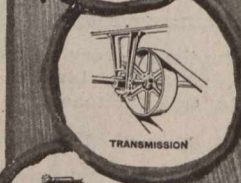
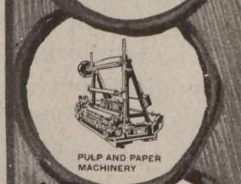
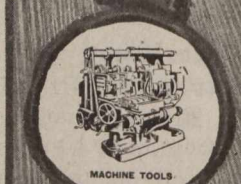
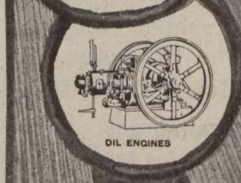
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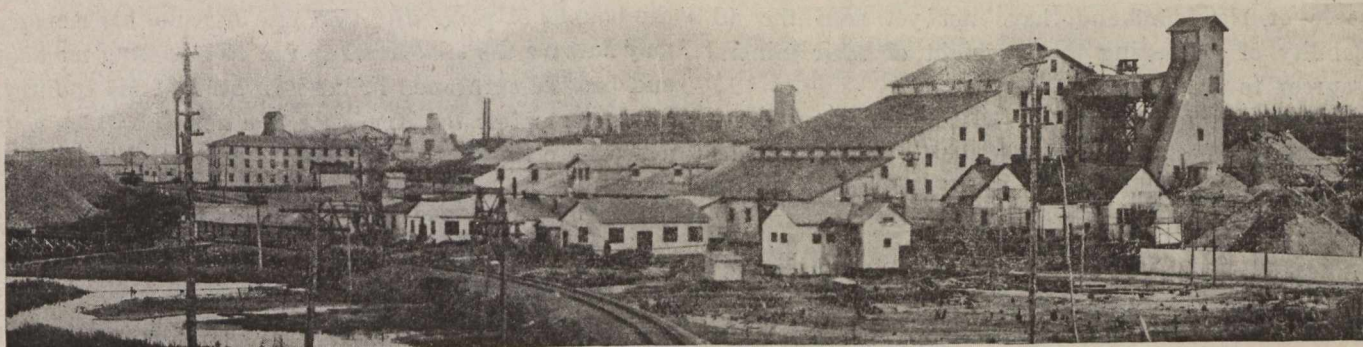
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## EDITORIAL

### *THE OCCURRENCE OF GOLD IN THE RAND BANKET.*

A paper by Mr. H. Pirow, Government Research Scholar, South Africa, dealing with the "Distribution of Pebbles in the Rand Banket and other Features of the Rock" is referred to in a recent issue to hand of the "South African Mining and Engineering Journal" which contains interesting speculations on the origin of the Rand Banket, particularly with regard to the distribution of pebbles in the banket, the presence or absence of which, Mr. Pirow concludes, has hitherto been erroneously used as a basis of correlation. Mr. Pirow's observations, which were conducted at the instance of the Research Grant Board, and by the assistance of a scholarship awarded for the purpose, are stated to strengthen the arguments for a placer origin of the gold in the banket. The main points brought out are "the fairly wide-spread occurrence of gold values in the banded pyritic quartzites, which may be regarded as originally layers of auriferous black sands, and the distribution of pebbles corresponding to that found under deltaic conditions". The evidence against the infiltration theory is that the payability of the reefs is by no means dependant on the presence of a specific kind of foot-wall, and that the gold in the banket is not normally associated with any particular mineral or igneous intrusions.

### *THE NEED FOR CO-ORDINATION OF GEOLOGICAL DATA.*

The remarks, above referred to, of the "S. A. Mining and Engineering Journal" regarding the occurrence of gold in the Rand Banket, are of interest because of the very different conditions of origin usually ascribed to Canadian gold occurrences, but the general remarks which our contemporary takes occasion to pass on the study of geology on the Rand are quite pertinent to Canadian conditions, and conditions elsewhere.

"There are two facts that strike the student of geology," writes the "S. A. Journal", "the first being the amount of fresh information continually avail-

able in the ever-growing area under exploitation in the mines, and the second the urgent need of gathering and co-ordinating data often noted by mine officials, but as frequently lost to geologists owing to the lack of a definite system of compiling geological records. It appears anomalous that mining officials should be forced to have recourse to the journals of scientific societies for geological information concerning the very properties on which they are employed."

Fortunately, in Canada, the institution of a central bureau for the gathering of geological statistics, which is suggested for the Rand, is not necessary, as there already exist in the Canadian Geological Survey and the provincial departments of mines—notably in Ontario and British Columbia—a repository for geological data which is being daily added to by a whole-hearted co-operation between these institutions and mining engineers and prospectors.

Nevertheless, there is quite a lot of information that is lost, particularly in those provinces that have not as yet any separate department of mines. In Alberta, Saskatchewan and Manitoba, many deep wells and other excavations revealing the nature of the strata have gone unrecorded, and an interesting note made at the Winnipeg Meeting of the C. I. M. & M. was that steps were being taken to record the sinking log of all government wells. This does not, of course, cover privately-sunk wells, and some steps seem desirable to secure records of this not-less important information.

Probably the most-neglected province in Canada in regard to mining and geology is New Brunswick, and, so far as we are aware, apart from the records of the Geological Survey, no provincial officer is charged with the preservation of the records of the quite numerous borings that have been put down in this province. Singularly enough, some of the earliest names on the geological roster of Canada are associated with New Brunswick, but, apart from the persistent endeavors of a handful of local men who believe in the mineral possibilities of the province, it has been passed over. To some extent, this is the

fault of the people of New Brunswick, who like the people of Newfoundland, have not yet seen the advisability of entrusting the oversight of their mineral resources to scientists.

It may be safely stated—without exaggeration—that there is no province of Canada (except Prince Edward Island) that can profitably dispense with a competent department of mines.

There is no more hopeful aspect to the mineral industry in the western provinces than the fairly general delegation of the oversight of mineral resources to men of scientific attainments.

The agricultural frontiers of Canada are now well within sight. The day of the pioneers of settlement and transportation is coming to a close. What is now needed in Canada is the scientific pioneer. Many of our mineral deposits must await for their development not alone the axe of the explorer and the advance of the railhead of communication, but the development of processes, the linking up of ascertained geological facts, and a general enlargement of the staffs of the technical departments of the federal and provincial governments.

There is not yet available, for example, a really worth-while text book on Canadian Geology. The nearest approach to such work is the admirable sketch of the Geology and Economic Minerals of Canada, by Young and Brock, published in 1909, but that is over a decade ago, and, as the authors explained, that work was but a sketch, and was published when, in Dr. Brock's words, "the mining industries of Canada may be said to have only just begun."

#### PRESIDENT WILSON.

Mr. T. A. Rickard, in "Mining & Scientific Press," writes in a recent issue regarding the Chief Executive of the United States, in words that have a proper ring of sincerity and sympathy.

"With most of his policies we were never in sympathy," writes Mr. Rickard, "for his irresolution before we went to war we had a feeling of resentment; we did not respond to his idealism and we did not admire his obstinacy, but he has played a great part in human affairs, and he has devoted himself with intense sincerity to the service of his country, therefore at this moment he seems a nobler figure to us than any of his detractors. . . . He sacrificed his health and his political career for the sake of the idea that was nearest to his heart. Today he is broken, humiliated, all his hopes shattered, all his policies frustrated, all his dreams ridiculed. We salute him with the deepest respect and the profoundest regret."

A finely conceived and courageous statement, which we believe the writer will read with increasing satisfaction as the passage of Time places Mr. Wilson in his proper elevation as a great man who played a great and decisive part in a battle of giants that closed an era of history. We are too near the event to assess Presi-

dent Wilson's place in human affairs, but it is within the bounds of possibility that like Lincoln, his memory may survive the ephemeral spleen of a passing moment and become enthroned in the Pantheon of his country. Two years after the Armistice, the news of which sent a world crazy with ebullient joy, it is remembered by some, and apparently forgotten by others, that it was on Mr. Wilson's fourteen points that Germany capitulated. Great as was the military power of the United States, enormous as is her wealth and educated population, history will state, we venture to assert, that President Wilson's personality, projected into European affairs through his category of the "fourteen points" did more to cause Germany and her allies to "crack up" behind the lines than did the pressure of the armed forces of the United States.

It is also within the bounds of possibility that in the years to come the "fourteen points" will overshadow the Constitution of the United States, which is the more probable, as they were founded upon that Constitution, being its modern exemplification; and were animated by the same spirit that urged those who wrote the Constitution and put their lives in jeopardy to defend it.

With no less respect do we salute President Wilson.

#### THE FIREBOSS.

A paper read before the Rocky Mountain Coal Mining Institute by Mr. D. Harrington, of the U. S. Bureau of Mines, on "Duties, Trials and Difficulties of the Coal-Mine Fireboss" touches a sore point in coal-mine organization. Mr. Harrington notes that the "fireboss," (which is the rather inelegant designation of the mine examiner) is a man of whom much is expected and to whom little is given. He is expected to cover much territory, in inadequate time, so that "he must travel at a rapid rate, or even run." Careful examination is in many cases quite impossible within the specified time and examination area. On his conscientious discharge of his duties depend the safety of many men, and yet the fireboss is given little executive authority, and much manual and unskilled labor is required of him that could better be delegated to an ordinary laborer. As to the wages paid the fireboss, Mr. Harrington makes a statement that is precisely correct, namely:

"In many coal mines the fireboss is paid by the day, like an ordinary mine laborer, or he receives a stipulated monthly salary, but deductions are made for days of absence from duty. This practically puts him on a basis of daily pay. Yet the fireboss receives in many mines a remuneration below that given common labor, and certainly far below that received by contract miners. Also, whenever the general wage scale is increased, only too frequently the fireboss, in common with other so-called salaried men, continues on the former schedule, although this may be even at that time, low compared with that which other workers receive."

Under these conditions it is not surprising that it has been found difficult to get good men to accept the onerous and ill-requited duty of the fireboss, who, as Mr. Harrington writes, has "practically no other authority than recommendatory, with practical exclusion from actual operations, generally with inadequate pay, abnormal working hours, and heavy responsibility as to both lives and property."

The tendency has been to fill the position of mine examiner with men who are debarred from other work in the mine by disinclination or inability, though the work of the mine examiner calls for physical and mental strength, and executive initiative in full measure. In addition, the fireboss should be technically trained in all matters connected with mine gases, dust dangers, electrical dangers, blasting and ventilation. That this is far from being the case is notorious.

In Canada, it is pleasing to note that provincial mining laws in a number of instances have recognised the anomalous position of the mine examiner, and one large coal company has taken steps to raise the status of the mine examiner to that of a really responsible official, and has also undertaken to make the remuneration such as will attract good men.

The position of fireboss should be considered to be a rung in the ladder of promotion to that of mine manager, as the duties not only require men fitted by mentality and training to fill official positions, but, when conscientiously carried out with understanding and a commensurate sense of responsibility, they develop such a type of man.

In ten out of sixteen colliery disasters investigated by Mr. Harrington, he lays the blame on faulty inspection by the fireboss, and expresses the opinion that the chief fault in coal mine inspection lies in the inadequate status given to this pseudo official in the organization of the mine.

The fireboss has too frequently been regarded as an official when responsibility for disaster was to be assessed, and as a day-laborer, unsupported by his fellows, when wages and hours were being decided.

The indeterminate status of the fireboss, and his unattractive wages, are very largely to be blamed for the paucity of aspirants to official positions at coal mines, and taken all in all the treatment accorded to the fireboss has been shortsighted, and provocative of much discontent and much inefficiency in production.

#### *MINES ACT ADMINISTRATION IN ONTARIO.*

There appears to be some danger, judging from a communication appearing in this issue from Mr. J. A. McRae, of Cobalt, that the mining men of Northern Ontario and the Minister of Mines may drift into a position of mutual misunderstanding, if not antagonism.

The opinion is fairly widespread among technically trained mining men that no one is so properly qualified to administer a mines department as one of themselves. Nevertheless, the obvious wisdom of giving the oversight of technical matters to a person who knows something about them is a counsel of perfection to which democratic governments have not as yet attained, and until mining men undertake the distasteful, but necessary, part of citizenship that includes political office, this elementary notion will never gain general acceptance.

The Minister of Mines of Ontario informed the fraternity, in meeting assembled at Toronto last March, that at one time he had swung a pick underground, which makes him an initiate of the honorable craft for which this journal aspires to speak. With such antecedents, it strikes us that Mr. Mills would welcome any reputable medium through which he could avail himself of the advice of the men actually engaged in the mining industry, previously to taking action under the powers of his office. The suggestion of periodical conferences made by our correspondent would seem to afford such a medium, and is in line with a request preferred by the mining men and prospectors of British Columbia to the Minister of Mines in that province, and with accepted practice in the province of Nova Scotia.

The action taken to collect a provincial tax of an amount that is trivial in comparison with the interests imperilled to collect it, was decidedly ill-advised, and not at all in accordance with the usual procedure for the collection of tax debts in municipal practice, where the procedure has been most completely worked out. Nothing alarms investors so much, or deters capital from venturing investments, as insecurity of title to real estate, upon which all stock issues are floated. So far as we are able to judge, the real criticism to which the Mines Department may be subjected in connection with this incident is not so much upon the action taken, but in regard to the failure to make certain that all interested persons were duly advised of the impending action and of their danger from default of payment. The throwing open of lapsed claims to immediate re-staking, without giving the defaulting lessee prior opportunity to re-enter upon payment of the sum owed, seems also to have been a harsh measure, and one that in no way enures to the advantage of the Province.

We believe that Mr. Mills is genuinely desirous to administer the Mines Act for the benefit of all concerned, and in strict compliance with its provisions, of which the Minister is the servant and not the creator; but he will lose a rapidly passing opportunity if he fails to fortify himself with a consideration of the studied opinions that such bodies as the Canadian Institute of Mining and Metallurgy and the Ontario Mining Association are prepared to give, upon request.

## Correspondence

Department of Geology  
Toronto University.

### Norite Occurrences.

To the Editor of the Canadian Mining Journal,  
Sir,

A new occurrence of nickel with norite is reported from Manitoba and, appropriately, at about the same time, Vogt's "Die Sulphid-Silikat-Schmelzlosungen" arrives from Norway. Vogt's report covers very elaborately the question of the origin of the nickel ores of Norway, always associated with norite or closely related rocks, and as he convincingly proves, always of magmatic origin. He describes and figures patches of pyrrhotite completely enclosed in fresh norite where even the susceptible mineral hypersthene is unchanged, and shows how important pyrrhotite-norite is in proving the magmatic theory of the formation of nickel deposits. This is a point which the one or two remaining opponents of magmatic segregation always pass over, since these widely scattered portions of ore in fresh norite are entirely unaccounted for by any theory of replacement. In the Sudbury region probably more than half of the ore is thus enclosed in pyrrhotite-norite.

Vogt shows also that the marginal ore deposits, he uses the Canadian term, have separated from the cooling and solidifying norite because the sulphides remained liquid at a lower temperature than the silicates of the rock. They were forced into all the fissures of the underlying rocks and often formed breccias of these rocks exactly as they have been shown to do at Sudbury. The copper ores, with the lowest temperature of fusion, are found chiefly at the lower and outer margin or in veinlets in the country rock, so that offset deposits are richer in copper than marginal ones. He shows also that the dimensions of the ore deposits are roughly proportional to the size of the norite masses with which they are connected, which accords with the magmatic theory and not with the replacement theory.

He shows, further, that the proportions of iron, nickel and copper in all the ores, whether from Norway or Canada, are much the same, which could hardly be the case if each deposit was formed for itself by solution replacement.

Perhaps the most interesting part of this report, and of a later one, published a year after, is the experimental examination of the relations of basic slags to molten sulphides of various metals, in which dozens of experiments reach results very similar to the actual field relations found in nickel ore deposits associated with norite or less often with peridotite. The solubility of sulphides in silicate magmas is thus studied on a small scale.

Professor Vogt attacks the subject of the magmatic segregation of sulphide ores from a new point of view and completely cuts the ground from under any theory of their formation by solution and replacement.

Canadians interested in the genesis of nickel ore deposits should acquaint themselves with this masterly study of a formerly much disputed type of ore deposits.

A. P. Coleman.

### PERSONAL

Mr. E. V. Neelands, of Toronto, has returned from Venezuela.

## OBITUARY.

James Percy Macnaughten, General Sales Agent of the Dominion Iron & Steel Company, died at his residence, after a long illness, on the 21st November.

Mr. Macnaughten was a resident of Sydney during the earlier stages of the Dominion Steel Company's activity, but in recent years has had his office at the headquarters of the Company in Montreal, and resided in the City. He was born and educated in Ottawa, and was 53 years old at the time of his death.

Those who knew Mr. Macnaughten personally are best able to appreciate his loss to his family, the steel industry in Canada, and to the Company with which he has been associated virtually since its first products were placed on the market. He was a man who did not seek publicity, but whose integrity, and loyalty could always be reckoned upon, as could also his assistance to a friend in need. His early death, following that of Mr. Francis H. Whitton of the Steel Company of Canada, measurably thins the ranks of the steel men of the Dominion, and is a distinct loss to that industry, but a much greater loss to his immediate business associates in Montreal, in Sydney and elsewhere.

### CLOSE OF THE BROKEN HILL STRIKE.

The Broken Hill strike was declared off on November 10th after having lasted eighteen months and cost twelve million pounds in loss of wages and profits. The terms on which the strike ended were arrived at under a judicial commission appointed by the Premier of Australia and the Government of New South Wales. Under the award wages are based on a minimum of 15s. Od. per day, hours to be 44 per week both above and below ground, with the provision that until a technical commission has reported on occupational diseases in the mines, and given a list of incapacitated men, the hours of labor underground are to be five shifts of seven hours each.

The companies in the Broken Hill District had no alternative but to fight the demands of the workmen, as these would have absorbed the whole of the profits of the industry.

With reference to the prospects of an iron and steel industry being established in British Columbia it is stated that the activity of the government in the obtaining of accurate information of the iron ore resources of the Province is to be continued. It long has been known that an important deposit of hematite ore exists on Sand Creek in the Fort Steele Mining Division and A. G. Langley, government mining engineer, recently inspected the property. His report is favorable, showing that there is a considerable body of massive red hematite which assays in places 57.4 metallic iron. He recommends that there should be further development and the Provincial Government, it is understood, will initiate diamond drilling and other work to the end that the deposit may be opened up and some information obtained as to the tonnage. Another property to which attention is to be given is the Zymoetz (Copper) River limonite deposits. These are situated in the Skeena River section of northern British Columbia and there is no doubt, from reports of J. D. Mackenzie, Canadian Geological Survey, and Wm. M. Brewer, Provincial Government, that these are of importance.

## A Norite of the Sudbury Type in Manitoba. A Reconnaissance. <sup>(1)</sup>

By R. J. COLONY, Ph.D. <sup>(2)</sup>

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Eighteen miles north, or slightly northeast of Lac du Bonnet, and about 35 miles east of Fort Alexander on the Winnipeg river, occurs a body of mineralized norite strikingly similar to the Sudbury norite of Ontario in origin and character. This mass of igneous rock is situated in the area bordered on the south by the Maskwa (Bear) river, and on the north by Cat creek, a tributary to the Maskwa river. It is roughly oval in shape at the surface, and occupies an area of 16 or 20 square miles. The shape of the mass, its textural, structural and compositional characters, and its relation to the associated rocks suggest an intrusive of roughly stock-like form and habit.

**Physiographic and Structural Features.**—Low, narrow, strongly glaciated and roughly parallel ridges with a general northeast-southwest trend, having a minimum width of from 150 to 250 feet, and a maximum width of from 500 to 1,000 feet, and ranging in length along the strike from a few hundred feet to two miles or more are characteristic of the region.

The ridges, varying in height from 20 to 100 feet are separated by, and surrounded with, spruce swamp and muskeg, so that while having the same general direction, they stand as islands in the surrounding lower

between the two being in some cases obviously igneous, tight and sinuous in the extreme, the greenstone in such cases exhibiting strong injection and "soaking" phenomena.

In other places both norite and greenstone are so strongly sheared as to suggest fault-contact rather than igneous; not infrequently sheer, vertical scarps, strongly suggestive of fault origin and running approximately in the direction of strike, cause the ridges to rise abruptly in cliff-like form from the muskeg. That more or less faulting has occurred is certain, and the writer judges that the faults are either strike-faults, or else they cut across the general trend of the ridges at very low angles.

A crush-zone of considerable length striking with the ridges may be traced from some distance northeast of the Anaconda claim (in the western end of the area) to as far as the Rio Tinto, and possibly beyond. On the Anaconda claim the crush-zone is about 150 feet wide, and on the Terra, on an 'island' in the muskeg, it is about 250 feet wide.

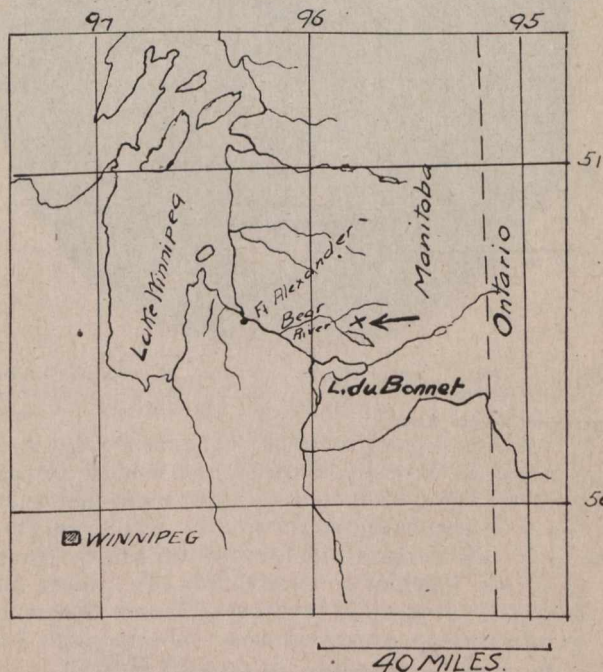
The extreme traceable length is nearly two miles, so that this sheared area undoubtedly represents a fault of some magnitude. On the northwest side of this crush-zone one encounters only norite; the elevations are here at their maximum, 100 feet or more in places, and the ridges are wide and long. On the southeast side of the crush-zone lies the norite-greenstone complex, in successive low, interrupted ridges separated by areas of spruce swamp and muskeg. Certain of the ridges in this part terminate in a manner suggestive of more or less lateral displacement by possible cross-faulting in an oblique direction, but this is not so absolute in indication as the more plainly evident crush-zones of the strike-faults.

The repeated alternation of norite and greenstone in approximately parallel ridges with alternating igneous and sheared contact between the two formations, and the occurrence of a wide crush-zone in the western part of the area with an abrupt change in structural habit and absence of greenstone, strongly suggest a step-faulted region, although the faults may not necessarily be of very great throw.

An effort has been made to represent this structure by a hypothetical section across the strike. The profile is not drawn to scale nor are the faults exactly shown. The section merely illustrates the structural conditions suggested by the habit of the norite-greenstone complex.

**The Formations Involved.**—So far as the writer's own explorations went, the norite body is completely surrounded with granite. While fairly certain of the delimitation of the area on the northwestern, northern and northeastern sides, he is not certain of the exact conditions of the southern boundary. Granite was encountered, however, on the Kelly claim, which lies in the extreme southeastern part, and the writer judges that it is safe to conclude that the entire mass of norite is surrounded by granite, mixed possibly with greenstone, into which the norite was intruded.

(3) The only formations to be considered then, are (a)



Approximate Position of Mineralised Norite Body herein described

ground. The ridges are undoubtedly connected, however, and provided the area was stripped of all cover, it would present an undulating, fluted aspect of interrupted ridges and low, flat valleys, striking northeast-southwest. The ridges within the norite area are in part norite and in part greenstone; many of them are composed of both norite and greenstone, the contact

(1) Submitted for presentation at the Western Annual Meeting, Winnipeg, October, 1920.

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the granite, (b) the greenstone, and (c) the norite and its various facies.

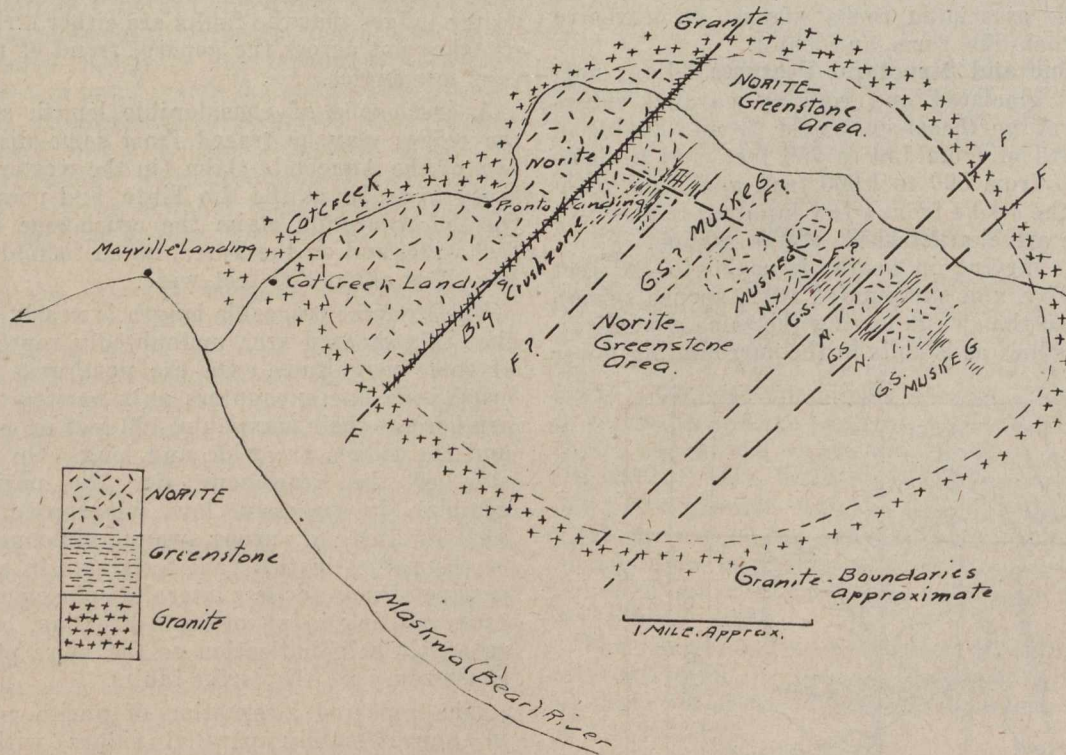
The granite has been tentatively called Laurentian

(3) The areal geology of the norite body and its exact extent have been worked out by Mr. W. S. McCann, and his assistants, of the Geological Survey of Canada. Mr. McCann camped on the Hititrite claim, near the writer's camp, and the writer had the pleasure of his company in the field. Mr. McCann's report will doubtless appear in the near future as a bulletin of the Department of Mines.

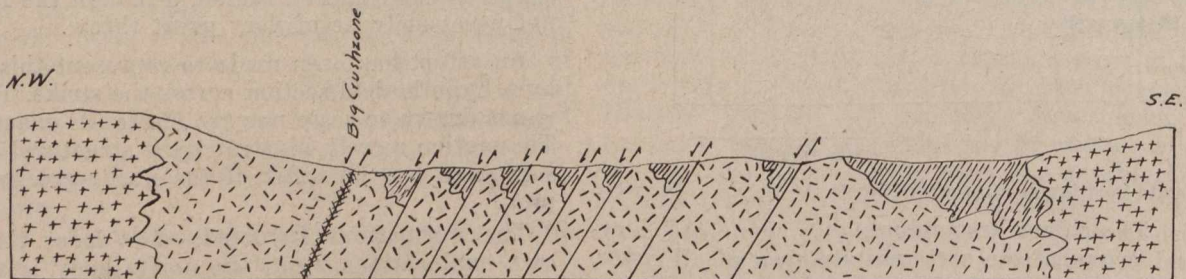
(4) Moore, Elwood S., Region East of the South End of Lake Winnipeg, Geological Survey of Canada, Summary Report, 1913. Sessional Paper 26, pp. 262-270.

(4) in part, and in part "post-Lower-Huronian". Additional and careful work will be necessary before the age of this granite can be definitely established. It differs from the granite one encounters along the Winnipeg and Maskwa rivers in the absence of included blocks of old gneisses and schists of presumably Grenville or Keewatin age, so characteristic of the granite *en route* to the norite area. Moreover, these xenoliths, representing stoped blocks of Grenville or Keewatin gneiss, had a complicated structural and dynamic history before they were intruded by the granitic magma in which they are now included.

They were *lit-par-lit* or injection gneisses; they do not in the least resemble the greenstones of the norite area in history, composition, structure or mode of occurrence. Yet these greenstones have likewise been



Structural Features and Boundaries of Norite Area



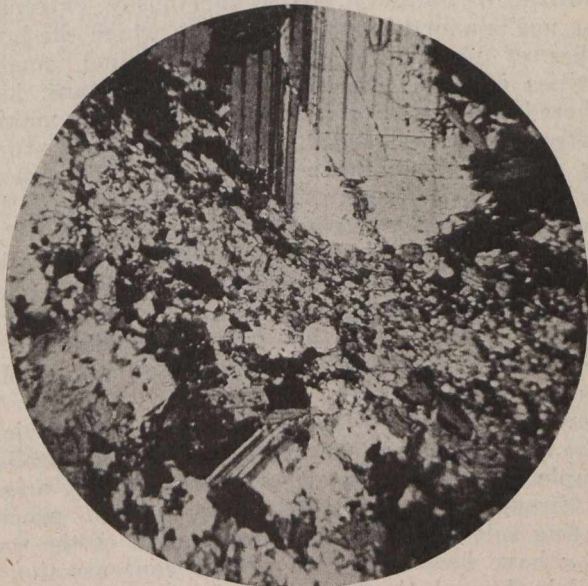
Legend. One Mile, Approximately

- Greenstone
- Norite
- Granite

Maskwa River norite. Hypothetical section across strike of ridges, showing structure suggested by the habit of the norite-greenstone complex.

called Keewatin; (5) it is because of the pronounced structural, dynamic, compositional and injection differences between the numerous included blocks in the granite, and the greenstone, that the writer has difficulty in correlation. Whatever the age of the granite, however, in the vicinity of norite, it is intrusive into the greenstone, but is intruded by the norite; and the granite, norite and greenstone are all cut by numerous pegmatitic dykes, more especially at, and near, the norite-granite contacts. It is judged that these pegmatite veins and dykes are related to the norite and represent extreme end-phase consolidation products of it. The granite, as represented by that phase of it which occurs on the Kelly claim, is moderately fine textured, pinkish-gray, and is composed largely of feldspar and quartz with a minor amount of biotite in very small flakes. The feldspar is dominantly potassic, with some admixture of the soda molecule and but very slightly sericitized.

The most striking feature shown microscopically is the marked inequi-granular aspect of the rock, which carries numerous hyp-idiomorphic microcline crystals



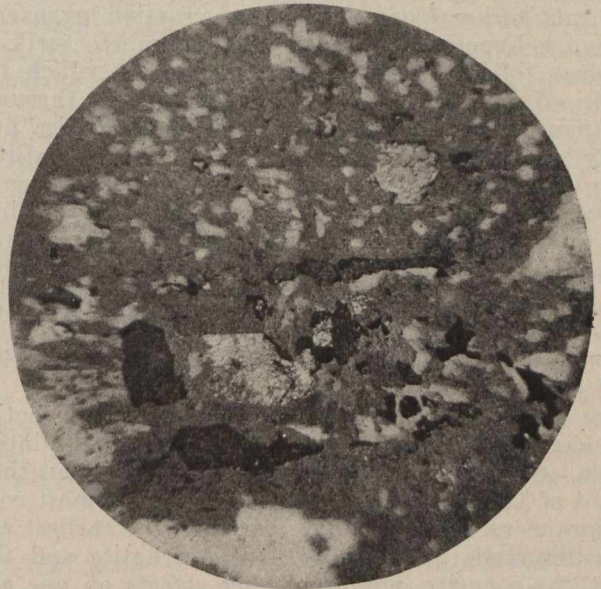
Photomicrograph of Maskwa River norite. Light polarized, nicols crossed, magnification 35 diameters. Showing micro-faulted plagioclase and granulation effects.

with crenulated margins, ranging from one-half to one centimeter in size and surrounded with much smaller grains, which give the rock a pseudo-porphyrific texture. There is also, in numerous other grains a strong tendency toward micrographic intergrowths on a very minute scale. The dominance of feldspar and quartz, the extremely variable textural habit and the tendency toward micrographic structures are characteristic of marginal phases of granitic intrusives, such as this rock is judged to be.

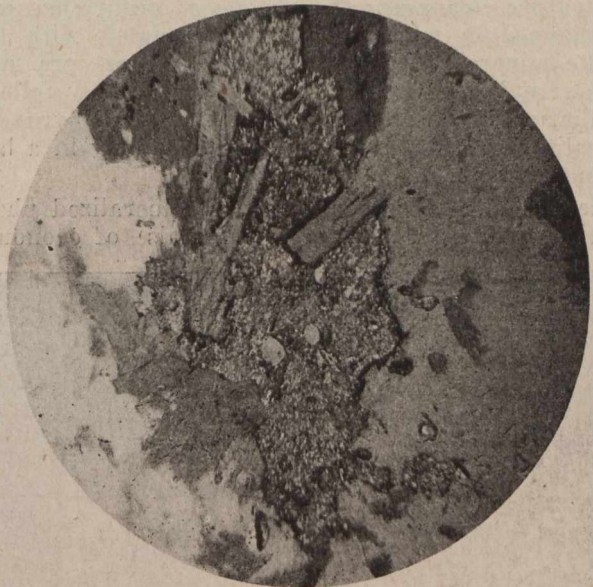
The greenstone is also more or less variable in texture, composition and structure, ranging from massive, fine to granular, dense dark-green rocks, to strongly sheared and schistose amphibolitic types. In some places the rock has been much shattered, especially along the sheared norite contact; in such cases healing

(6) Roberts, Hugh M., and Longyear, Robert Davis. type are in general assigned to the Keewatin, and Moore follows the usual custom of placing the greenstones (basic metamorphosed igneous types) of the Rice Lake series in that division. 1918, pp. 27-67.

has been effected largely with quartz, which occasionally forms veins of some size and not infrequently shows mineralization to a small degree, chiefly pyrite and chalcopryite. Curiously enough, while the trend or strike of the ridges is northeast-southwest, the schistosity developed in places in the greenstone (not along the norite contact) strikes in a variable way from almost directly east-west to West 8° North, thus making evident a secondary or cross structure, in the direction of which lies the foliation in the



Photomicrograph of quartz-norite, taken in combined reflected and transmitted light, magnification 35 diameters. The green amphibole is strongly poikilitic, acting as host for numerous quartz grains. The metalics (magnetite, pyrrhotite and chalcopryite) are replacing the amphibole and penetrating cracks.



Photomicrograph of norite taken in combined transmitted and reflected light, magnification 35 diameters. A stringer of pyrrhotite replaced in part by chalcopryite (lighter). The sulphides themselves are cutting and replacing the feldspar (light gray) and are encroaching upon and replacing the green amphibole (dark gray).

greenstone and occasional small shear zones as well. In places near the igneous contact the greenstone is thoroughly impregnated with noritic matter; one of the most remarkable manifestations of this phenomenon may be seen on the Vidi claim, where crystals of labradorite, five to ten centimeters in size and resembling huge phenocrysts, are scattered through

an otherwise fine textured, dense greenstone. Injection and impregnation are so pronounced in this vicinity that the large bunches of plagioclase are clearly due to those processes. In such places, also, the greenstone is slightly mineralized.

The norite is of simple composition, but varies both in texture and mineral make-up to some degree because of differentiation. In general it is composed almost wholly of basic feldspar ranging from andesine to labradorite, and carries as the only ferro-magnesian component a green amphibole, or actinolite, derived by uralitization from a former magnesian pyroxene, probably hypersthene. One of the most striking features of the rock is the manner in which the uralitized pyroxene encroaches upon, cuts through, and penetrates the feldspar (which is otherwise perfectly fresh and unaltered) in every conceivable direction; it is clearly a product of the action of magmatic and-phase-consolidation matters upon an original containing both magnesia and iron, i.e., hypersthene.

The feldspars have not been affected in any other way; they are hyp-idiomorphic, with crenulated margins, showing granulation along the borders in some cases, with wedge-twinning, bent grains and micro-faulting.

The ore minerals are magnetite, ilmenite, pyrrhotite and chalcopyrite, all closely associated and intergrown. So far as a time relation can be made out they are all of late magmatic stage, essentially almost contemporaneous, but overlapping, so that the earliest are magnetite and ilmenite, the next pyrrhotite and the latest chalcopyrite, with replacing effects on one another in the order named.

They occur in blebs, in irregular patches, stringers and veinlets, lying in, surrounding, cutting and replacing the silicate minerals of the rock, and penetrating cleavages; their mode of occurrence and the manner in which they are associated with the silicate minerals clearly indicate that these ore minerals were formed later than, but immediately following the magmatic alteration of the original pyroxene to uralite, thus placing them very definitely in a late magmatic stage.

The 'ore', therefore, is merely a mineralized phase of the norite itself. The ore minerals of economic

value are chalcopyrite and nickeliferous pyrrhotite, distributed, with a little magnetite, ilmenite and pyrite both in disseminated grains throughout the norite, and more especially, segregated along the igneous contact between the greenstone and the norite, where mineralized zones occur up to 150 feet in width (at the surface).

Various assays have been made of samples taken from different localities, and the maxima and minima are here given. The maxima and minima of a large number of assays of Sudbury material (6) are also given for the purpose of comparison.

	Copper		nickel		Platinum	
	Max.	Min.	Max.	Min.	Max.	Min.
Maskwa River norite . .	3.60	0.68	1.68	0.29	0.03	0.01
Sudbury norite . . . . .	1.79	0.61	2.97	1.14	0.02	0.03

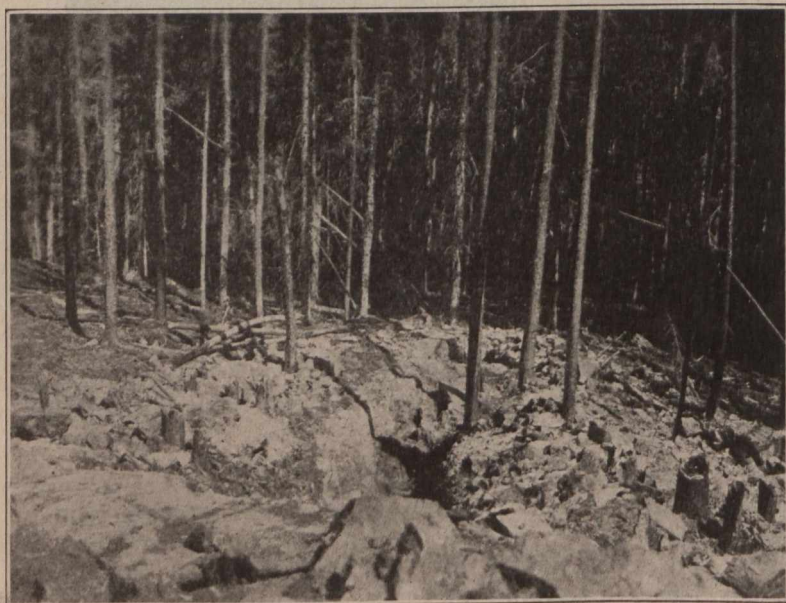
Marked differentiation is exhibited within the limits of the norite area so that one finds typical coarse-textured norite, finer-textured and less basic phase, quartz-norite somewhat similar to the norite (micro-pegmatitic) of Sudbury, coarse anorthosite, extremely coarse norite-anorthosite pegmatite in which the large bunches of plagioclase separated by much smaller quantities of dark interstitial ferromagnesian, have weathered chalky-white on exposed surfaces, making an extremely striking rock. Very acid, fine-textured facies, doleritic norite, veins and stringers of magnetite as well as a body of magnetite of considerable size that lies in the muskeg on the northeast corner of the Copper Contact claim, and pegmatite and quartz dykes and veins judged to represent the extreme end-phase of consolidation. There are also later basic dykes, from an inch to eighteen inches in width, cutting the norite in many places, and frequently offset by small faults.

The ore minerals are essentially magmatic in origin, but the writer does not conceive them to be the product of simple magmatic segregation; nor have they originated through the action of hydro-thermal process operating subsequent to the consolidation of the rock.

They have been produced by the concentration of materials through the action of selective freezing, and belong to a very late magmatic stage during which the ore minerals, acid 'juices' and mineralizers were concentrated so as to become a very mobile, pervasive solution of essentially aqueo-igneous character, capable of penetrating and replacing to a marked degree. The very extreme end-phase-manifestation of this, the writer takes to be the quartz veins and stringers which, in addition to quartz, carry carbonate and epidote, and sometimes pyrite and chalcopyrite.

The writer has called this norite the *Maskwa River Norite*; judging by (a) its character and origin, (b) its extent, (c) its striking similarity to the Sudbury norite, (d) the occurrence of mineralized zones and the assay returns on these, it seems reasonable to state that this body of igneous rock and its 'ore' compare very favourably with, and is strikingly similar to, the occurrence at Sudbury.

(6) Roberts, Hugh M., and Longyear, Robert Davis. "Genesis of the Sudbury Nickel-Copper Ores as Indicated by Recent Explorations." Trans. A.I.M.E. LIX.



Trench across norite 'orebody' on the 'Hititrite' claim. The 'orebody' is here a mineralized zone 150 feet wide, along the norite-greenstone contact. Muskeg in the background.



# The Administration of the Ontario Mining Law

Minister of Mines Should Consult Representatives of  
Industry Before Taking Legislative Action.

J. A. McRAE, Cobalt.

What is interpreted in the district of Temiskaming, inclusive of the silver and gold mining areas of such fields as Cobalt, Porcupine, Kirkland Lake, Gowganda, etc., as being a chaotic state of affairs, exists in the administration of the Mining Laws of Ontario, at least to the extent which it is taken out of the hands of the Mining Recorders and the Mining Commissioner.

New legislation and the injudicious application of former laws has caused a feeling to grow which threatens to discourage prospectors and capital alike from entering this field. By reason of a few alterations to the Act, and the application of powers of confiscations which were probably never intended to be enforced, the present administration has brought down criticism of the Mines Act of Ontario which formerly held a place with the most satisfactory mining law in existence in any province or state.

Cooperation between business men all over Canada and the United States who have made it their business to assist prospectors with grub-stakes has been eliminated to a large extent by a regulation which prohibits a prospector from staking more than three mining claims or more than nine altogether for himself and on behalf of others. It had formerly been the intention of the past Government to encourage as much staking as must be done in order to hold the claims. Consequently, the more work, the greater chances for developing paying mineral deposits. The new regulation, of course, may be evaded by simply hiring someone to buy a Miners' License and have them do the required staking. The difference is that the prospector is thus obliged to turn employer and is penalized to that extent. The measure seems calculated to cause inconvenience and friction rather than cause any benefit.

Further new legislation renders it necessary for a prospector to first ask for permission to use timber before erecting a cabin or using any such timber for mining purposes. Not only this, but whereas the old law permitted a claim holder to remove pulpwood if he so desired, the new regulation prohibits this. As a consequence, the bushfires which seem bound to occur in areas where extensive prospecting work is being carried on, and where ground must be cleared for building and mining, seems destined to destroy much of the timber which otherwise might be turned into revenue for the claimholder and to the benefit of the country in general. Much of the incentive to protect such timber may be lost where the claimholder has no claim to it.

## Confiscation of Claims.

Perhaps the most unfortunate occurrence of all has been the confiscation Order-in-Council of October 13th, by reason of which serious loss has been incurred by conscientious claimholders. Finding a provision in the Mining Tax Act, being Chapter 26, R.S.O., 1914, that conferred such power on the Ontario Government, the Minister of Mines passed an Order-in-Council declaring all patented mining claims forfeited to the Crown on which a certain provincial tax of some 5 cents an acre or \$2 per claim per year had not been paid. The Order further provided that these claims should be

open for re-staking on and after noon of October 28th. Many property holders declare they knew nothing about such a tax and received no notice. However, the Order went into effect on the 13th. As a consequence of this, many titles to freehold land have been revoked. Even the Teck-Hughes Mine with a plant valued at perhaps \$200,000 and with several hundred thousands of dollars in ore blocked out and producing at the rate of about \$1,000 every twenty-four hours was among the properties listed for forfeiture. It was only thirty minutes before the hour set on October 28th, that the Government was induced to withhold the property from staking. Nevertheless, forfeiture had occurred on the 13th, and the Teck-Hughes is now technically Crown Land. This, of course, is now being rectified and in due time no doubt the title will be re-established in the name of the Teck-Hughes Mining Company. The Little Pet mine, near the Dome Mines in Porcupine was forfeited and did not even get a release. It was forfeited for a matter of a few dollars, yet is equipped with a small milling plant of its own. Various other instances of this nature may be cited.

## Contrary to British Law.

The question now being raised in all seriousness is that having to do with the application of a confiscation law. The point is raised as to whether such is really permissible under British law. The matter of enforcing collection of taxes finds general support all over the North, but carrying this to a point of confiscation with no avenue left by which title may be redeemed is thought to be stretching authority beyond the point intended by the framers of such a law. The procedure in regard to real estate on which taxes are owing, is to list such property subject to sale as against the levies due. The sale of such property is carried out subject to the former holder redeeming title if within thirteen months he pays the taxes due plus the expense caused by his neglect. Such procedure is regarded as being reasonably fair to all concerned.

## Prospectors Discouraged.

So different is this attitude from that of former Governments, that mining men of Northern Ontario are scarcely able to believe their senses. The effect upon outside investors and capitalists will damage Ontario in their eyes. These interests who spend many thousand of dollars yearly in helping develop the mineral resources of this country and who had formerly held the laws of the province in very high regard, now find deeds which they carry have been revoked,—due to the non-payment of a certain provincial tax which they declare they knew nothing about and amounting to only \$2 per claim each year. Not a few prospectors have openly declared they are through with mining in this country so long as such state of affairs is permitted to exist. These men are numbered among those who are not given to complaining habitually.

## Pioneer Suffers.

An instance of the manner in which pioneers have been penalized may be cited in the case of E. J. Morrison, of Haileybury. Mr. Morrison is a citizen of

moderate means, having a small dairy business in the town of Haileybury. Some years ago, he lent his support to the general activity in the Kirkland Lake district, acquired a mining claim on which he performed the necessary assessment work at a cost of some \$1,200 from money saved from his little business. Mr. Morrison knew nothing about the Provincial tax of \$2 a year on the claim and as a consequence the Government confiscated his ground. No offer of relief has been made.

The situation as it exists was not altogether unforeseen at the time of the ascendancy to power of the present administration. Indeed such fears were openly expressed prior to the selection of a cabinet by Premier Drury. This journal appealed at that time for mining representation, but the appeal fell upon deaf ears.

Hon. Mr. Mills, who was appointed as Minister of Mines, was formerly a locomotive engineer. There has been no effort at any time to discredit his ability in connection with matters about which he possesses knowledge. At the same time, on no occasion does it appear to have been possible to point to any reasonable hope of the judicious administration of the mining laws of the Province by one not familiar with the industry.

**Hoped in Vain.**

It is true that for a time critics grew silent, on the strength of the hope that not being familiar with the mining industry, the new administration would at least avoid meddling with the Mining Act. This hope has long since become dissipated and mining interests are now standing in fear with the question on their lips: "What Next?"

Finally, this danger appears to lie ahead. It is feared the new administration is contemplating a further so-called revision of the Mining Act. To the extent of the changes contemplated, ego may in a large degree constitute the answer. The spectacle of an amateur, already accused of creating chaos in Ontario's mining laws is causing some uneasiness, and the Minister would seem to be well-advised to go slowly. It may be expected that mining men and prospectors will submit an appeal to the Premier to discuss this matter seriously with his lieutenant.

Meanwhile, capital, much needed foreign capital, is hesitant, and in the meantime prospectors profess to be discouraged.

**Possible Remedies.**

In conclusion, there are two suggestions that might be made with the view of preventing further chaos. First, is this:—It would be a wise procedure for the Ontario Department of Mines to hold periodical conferences of its staff of Mining Recorders from the various mining divisions, and with these gentlemen, together with the Mining Commissioner, hold a joint conference and obtain expressions of opinion and general discussion before enacting legislation calculated to alter the existing laws. The second suggestion is this:—To establish a Mining Court, giving the Mining Commissioner powers equal to a County Court Judge, armed with the authority to deal in a similar manner with patented mining lands as is now vested in that official when dealing with unpatented lands. The verdict rendered in all such cases would be the result of deliberations between men fully acquainted with the mining industry and the meaning of the Mines

Act. It would stabilize administration, remove the worry and responsibility from the political representative at the head of the Department, and would shield prospectors and mining men from such mistakes as have recently been committed.

**TORONTO MINING STOCK QUOTATIONS.**

Following are the average quotations for active gold, silver and oil stocks, on the Standard Mining Exchange, for week ending 20th November, 1920.

**Silver.**

Adanae Silver Mines, Ltd . . . . .	2	1¾	1⅞
Bailey . . . . .	4½	4	4
Beaver Consolidated . . . . .	34½	31½	32
Chambers-Ferland . . . . .	6	5½	5½
Cobalt Provincial . . . . .	40	35	35
Coniagas . . . . .	2.35	2.35	2.35
Crown Reserve . . . . .	20	19	19
Hargraves . . . . .	1¾	1¾	1¾
La Rose . . . . .	28½	26	27
McKin.-Dar.-Savage . . . . .	48	47½	48
Mining Corp. of Can. . . . .	1.65	1.60	1.64
Nipissing . . . . .	9.75	9.50	9.60
Ophir . . . . .	1¾	1¾	1¾
Peterson Lake . . . . .	11½	10¾	10½
Silver Leaf . . . . .	1	1	1
Temiskaming . . . . .	29½	25¼	26
Trethewey . . . . .	25¼	21½	23¼

**Gold.**

Apex . . . . .	1½	1½	1½
Atlas . . . . .	12¾	12½	12½
Dome Cons. Mines . . . . .	13.45	13.00	13.00
Dome Extension . . . . .	48	45	48
Dome Lake . . . . .	3½	3	3⅞
Gold Reef . . . . .	3	2.7	2⅞
Hollinger Cons. . . . .	5.60	5.44	5.60
Hunton Kirl'd G.M. . . . .	10	9	9
Keora . . . . .	16½	14½	15¼
Kirkland Lake . . . . .	40	39	40
Lake Shore M. Ltd . . . . .	1.03	1.00	1.02
McIntyre . . . . .	1.92	1.88	1.92
Moneta . . . . .	8	8	8
Porcupine Crown . . . . .	21	20	21
Porcupine Imperial . . . . .	¾	¾	¾
Porcupine V.N.T. . . . .	21	20¼	20¼
Preston East Dome . . . . .	2½	2½	2½
Schumacher . . . . .	19	18	18½
Teek-Hughes . . . . .	6¼	6	6
Thompson Krist . . . . .	6½	6	6½
West Dome . . . . .	5½	5	5½
West Tree Mines Ltd . . . . .	5	4.7	4.7

**Oils.**

Rockwood Oil, Gas . . . . .	2¾	2½	2⅞
Vacuum G. . . . .	25	24	24½

**METAL QUOTATIONS.**

Fair prices for Ingot Metals in Montreal Nov. 24th, 1920. (In less than carload lots).

	Cents per lb.
Copper, electro . . . . .	19
Copper casting . . . . .	18½
Tin . . . . .	45
Lead . . . . .	7¾
Zinc . . . . .	8½
Aluminum . . . . .	34
Antimony . . . . .	8

## Northern Ontario Letter

### THE SILVER MINES.

#### The Cobalt Field.

At the time of writing, shortage of electric power continues to constitute the chief problem of the mines in the Cobalt district. Like in the majority of such instances, however, the situation is exaggerated, and pessimistic views gain ground rapidly.

Last week's reference to this, was made clear when it was stated that by eliminating all non-essential work, it is believed the power situation will not become any more satisfactory than as at present.

It is now announced the Mining Corporation of Canada, the largest individual power consumer in the Cobalt district, has been able to reduce its power consumption to the extent of 700 h.p. without interfering with the usual operation of the mine. This has been made possible by reason of summer operations having resulted in storing up a large surplus of tailings, which makes it possible to close down sand-pumping operations for the winter. This company could go still further, if necessary, and close the old Buffalo mill for the winter and thus further reduce its power consumption. Not only this, but by utilizing its auxiliary steam-driven equipment, the mine itself could be operated without hydro-electric energy. This would leave it necessary only to draw sufficient electricity to operate the mill. Such steps, of course, may not be necessary, but are mentioned in order to show the lengths to which the company could go and still continue production. This summary should discount pessimism.

A moderate amount of rain is officially reported by the Meteorological station at Haileybury, during the third week of November. This rain has fallen on top of several inches of snow, and has created a condition which would quickly alter the power situation should a reasonable amount of additional rain fall.

A discovery of importance has been made at the 385-ft. level of the Chambers-Ferland mine. Special arrangements had been made to drive a long cross-cut through that part of the property lying between the Nipissing and the LaRose. A lease was secured to carry this work on through a shaft on the Right of Way mine, the object being to carry the cross-cut some 500 feet so as to connect up with the main workings on the Chambers-Ferland. This work had progressed not more than 150 feet when ore was encountered. A feature of the find is that at the present point of operation the cross-cut is traversing a layer of slate formation. Good milling values have been found over a width of 22 feet. The average over 4½ feet is 28½ ounces to the ton, while the lowest over the entire 22 feet is five ounces per ton. It is now planned to sink a winze to the underlying conglomerate formation which is estimated to lie not more than ten feet below the cross-cut. It is believed a high-grade vein occurs in the conglomerate, the values encountered in the slate indicating this.

Reports were in circulation early in the past week to the effect that the Temiskaming mine was curtailing operations. Inquiry revealed the fact that only a few carpenters had been laid off and that the Temiskaming is operating both mine and mill as usual. Mr. Gordon Dickson, manager of the Blue Diamond Coal property in Alberta, paid an official visit during the past few days to the Temiskaming mine.

A small force of men are at work on the O'Donald property, in Lorrain, formerly known as the Lang-Caswell. What appear to be the more important veins

are being examined, and a pump was shipped this week for the purpose of de-watering part of the underground workings. This is one of the properties which became forfeited by reason of the application of the Order-in-Council of Oct. 13th, which declared all patented mining claims forfeited to the Crown, on which certain provincial taxes of some \$2 per claim had not been paid. The property was re-staked by J. C. O'Donald, of Haileybury.

It is now intimated unofficially that the Department of Mines is contemplating action to re-establish title to properties forfeited under the recent Order, at least in such cases where a hardship appears to have been imposed.

#### The Elk Lake District.

The work of erecting camp buildings for the accommodation of additional men is proceeding on the property of the Cane Silver Mine. Returns have not yet been received from the shipment of high-grade ore recently made, but it is understood the ore contained an average of at least 500 ounces to the ton. It has not yet been determined to what extent operations will be carried on this winter, and the question of installing a small mining plant has not yet been definitely decided upon.

The Regent Silver Mines is continuing operations, and has made preparations to carry on work throughout the winter. It is planned to make a shipment of ore some time early in the new year.

Additional machinery is being taken into the property of the Gold Nugget Products Company, situated in the southern part of the township of Henwood on the Elk Lake branch of the T. & N. O. Ry. The property was first opened up some two or three years ago by Mr. Stone, of Toronto, and was subsequently purchased by A. R. C. Smith and his associates. Among the products from the property is a good-grade pumice stone. It is also reported a granite outcrop on the property has been found to be of commercial value, the grade being such as is required in the manufacture of tombstones, etc. The representative of the "Journal" has not yet had an opportunity to investigate the accuracy of the report, which comes unofficially. The company's address is Kenabeek, Ont.

Financial arrangements are under way with a view toward opening the Paragon-Hitchcock property. Former work met with encouraging results, and encouraged the control to make another effort to develop the property.

In a general way, the lower quotations for silver have not had much adverse effect on the activity in the silver-mining areas. The fact is kept in mind that before the war and for some time after its commencement, the operators considered themselves fortunate when receiving around 60 cents an ounce. They are pointing to the fact that the price now is averaging around 80 cents an ounce, with the cost of supplies used in connection with mining gradually declining.

#### Ore Bullion Shipments.

During the week ended Nov. 19th, only two Cobalt companies shipped ore, the following being a summary:—

Shipper	Cars	Pds.
Dominion Reduction . . . . .	1	83,000
O'Brien . . . . .	1	64,890
Totals . . . . .	2	147,890

During the corresponding period the Mining Corporation sent out a large shipment of bullion, made up of 97 bars containing 100,201 fine ounces.

### THE GOLD MINES. The Porcupine Field.

The gold mines of the Porcupine district are rushing operations to the fullest possible capacity permissible with the available supply of hydro-electric power. Not only this, but all the auxiliary equipment available is being employed so as to take advantage of the improvement in the supply of labor.

An instance of the determination of the companies to enlarge the scope of operations may be found at the Dome Mines, where a large number of miners have been engaged to work with hand-steel. Not content with operating to the full limit of the power supply, the company has decided to speed up work beyond this point, and has placed not far under a hundred miners underground with hand-steel.

A serious break has occurred in the big underground crusher at the Dome, and temporary shift has to be made to make up the deficiency. It is understood some little time is expected to elapse before the new part may be secured, and the question of installing two small crushers as a temporary measure is being considered. In the meantime, an endeavor is being made to break the ore as fine as possible by overcharges when blasting.

On Dec. 1st., the Hollinger Consolidated will disburse a dividend of 1 p.c., amounting to \$246,000. This is the 8th dividend to be paid so far during the current year and is expected to be followed by another on Dec. 28th, making a total of 9 p.c. or \$2,214,000 for the calendar year.

Total dividends from the silver and gold mines in the district of Temiskaming, made up of mines at Cobalt, Porcupine and Kirland Lake, will amount to well over \$7,000,000 for 1920. This approximates the average paid yearly for the past fifteen years and is pointed to as a highly favorable achievement in view of labor shortage and power shortage caused by low water. The 1920 achievement exceeds by over \$600,000 the record made in 1919. This increase was due to the Dome having resumed dividend disbursements at the interim rate of 2 p.c. at intervals of about three months, as well as the Hollinger having paid 8 p.c. and 1 p.c. more expected as compared with 7 p.c. last year. Such an increase having taken place at the gold mines during a period when economic conditions were generally unfavorable is pointed to as an indication of further increases during the coming year.

Work on the Porcupine Crown and the Thompson-Krist mines, now operated by the Northcrown Company, is proceeding at a rate somewhat below normal. The mill is permitted to operate only intermittently, owing to the shortage of electric power. As regards the intimation made some months ago in the "Journal" relative to a capital increase being under consideration, nothing has recently been heard. It is believed, however, such a measure may be adopted just as soon as the opportune time appears to have arrived. With the present power shortage, the time is not regarded as being opportune, but with the arrival of Spring, everything should be working in favor of gold mining.

#### The Kirkland Lake Area.

Mill construction at the Wright-Hargreaves mine is now in its final stages, and the machinery will soon be ready to turn over. Chemical supplies have been placed on order and with an improvement in the hydro-electric supply the company should join the producers early in the New Year.

The case involving the re-staking of the Teck-Hughes

property was heard last week in Haileybury, the stakers claiming \$20,000. The defense put up was based on the fact that a special Order-in-Council passed in Toronto just before the hour of forfeiture precluded any right of any prospector to restake the property. The case was heard before Mining Commissioner T. E. Godson, K.C., the decision being reserved.

Shaft sinking on the Lake Shore mine is now well below the 500-ft. level. A station will be cut at a depth of 600 ft., and the shaft will then be continued to a depth of 800 feet. The scheme of development will be to open up two operating levels, one at the 600 and one at the 800-ft. level. This is expected to add greatly to the volume of known ore and may reasonably lead to a decision to increase milling facilities.

#### Shiningtree Area.

The court has dismissed the injunction in the Wasapika dispute which was referred to in last week's "Journal," and dissolution of the Wasapika Gold Mines, Ltd., will now proceed in accordance with the Ontario Company's Act. This company is being absorbed by the Wasapika Consolidated.

#### Boston Field Creek.

Development work on the Miller Independence Mine, at Boston Creek, has been quietly but steadily progressing during the past few months, the pace of operation being considerably greater than at any previous time in the history of the enterprise.

Chief attention is being devoted to the systematic exploration of the 500-ft. level where work is in progress at three points, and where a plan of diamond drilling is being formulated. This program is to first thoroughly explore in a lateral direction all of the formations in several areas not yet penetrated by cross-cuts, and then to test their value at depth possibly down to about one thousand feet.

In the main north cross-cut at the 500-ft. level, a vein was encountered at a point 250 feet from the main shaft. Subsequent development has shown this to have characteristics very similar to those of the hanging-wall vein in the faulted zone at the second level in the "D" or telluride shaft. This vein is being followed, the present face of the drift being at a point almost directly beneath where the "D" shaft was started. It is intended to continue its exploration and development right to the northern boundary. Should this vein prove by further development, as seems probable, to be identical with the hanging-wall vein at the upper level, indications would seem to point to a combined straightening-up and fault-displacement of all the formation for about 300 feet northward below the plane of movement. In continuing the drift on the hanging-wall vein, to the boundary, not only is the rock formation being proved by actual examination but facilities are also being created simultaneously for subsequent exploration of the telluride and all other veins scattered throughout the property, by means of diamond drills.

The Miller Independence, in common with the mines of Cobalt and Kirkland Lake, draws its electric power from power plants on the Montreal River. Last summer, however, as a precautionary measure against possible contingencies, two of the old steam-boilers in use prior to the installation of the hydro-electric system, were thoroughly overhauled, re-tubed and put into efficient repair. The company also engaged woodcutters during the past few months, and as a consequence is in a position to utilize this auxiliary plant and upon the hydro-electric power supply.

## British Columbia Letter

### Prince Rupert, B.C.

On his return from the Premier Mine, Salmon River District, Portland Canal, Mr. H. A. Guess, vice-president of the American Smelting & Refining Co., is quoted as saying that the development of the Premier mining property has disclosed actual ore, and the possibility of a greater tonnage than has yet been proved, that comes up to the most optimistic expectations. He referred to the plans being made to ship over the snow during the winter and stated that the muddy condition of the road during the Summer made the transport of ore to the Coast during that period impracticable. Two caterpillar tractors and sleds are the transportation facilities provided for use as soon as the trail hardens. The water power plant at the Premier will be in operation in less than a month, permitting the utilization of larger compressors and more rapid progress in the development and exploratory work now underway. The Cyanide Mill will be complete and in operation early next year.

### Trail, B.C.

Ore receipts at the Trail Smelter of the Consolidated Mining & Smelting Co. for the last ten days of the month of October, totalled 12,125 tons of ore and concentrates.

### Hedley, B.C.

Official announcement has been made of the closing down of the Nickel Plate Mine of the Hedley Gold Mining Company. Most of the employees have been discharged, only enough being retained to put the plant in such a shape that it will be ready for the resumption of operations when the time comes. The circumstances leading to this action are reviewed by the management in a statement given publicity in British Columbia. It is explained that during the war the mine was continued on a producing basis because it was felt that the gold was needed and after the Armistice it was thought that economic conditions would so improve that it would be possible to pay dividends on the capital invested. This anticipation has not been realized, as the management puts it: "We have been disappointed in this conclusion and find that we cannot earn reasonable dividends under existing conditions and maintain our reserves of ore." It is added that the shut-down is but temporary, that it will last probably for one year, and that the mine and plant will be in good condition to resume work when times improve. It is felt that under pre-war conditions or even 20 per cent thereof, "we can earn good dividends." That it had been hoped that the Government would do something to encourage the production of gold and that the Company has been disappointed in this, too, also is set out.

G. P. James, General Superintendent of the Company, does not speak as optimistically as the statement reads. He asserts that it is absolutely out of the question for the plant to be worked at a fair profit until prices of supplies, etc., come down to within 20 per cent of pre-war conditions. It was not expected that wages would drop to that extent and personally he did not think that material would decline sufficiently within a year to permit the re-opening of the Mine and the Mill. It might be two years or more before this happened; in fact the shut-down was for an indefinite period.

That the closing of the Nickel Plate is to be regretted

by reason of the effect on the mining industry of the Province as a whole, cannot be gainsaid. One of the reliable producers over a long period of years, a mine the output of which in gold amounted to approximately 35,000 ozs. in 1917 and 1918 and little less in 1919, it has contributed substantially to the annual production of British Columbia. Not only is this true but there is the purely local aspect. The prosperous little town of Hedley has received a blow that it is hard to see how it can sustain and survive. The miners are leaving their families there while they go out and look for work to tide over the winter, but that they will move away as the breadwinners adjust themselves to the changed conditions is a foregone conclusion.

### Vancouver, B.C.

Fifty gold bars, valued at over \$500,000, have been shipped from the Dominion Assay Office of this City to Ottawa, the Canadian Capital. This represents the takings of the year up to the present date. The 1920 season is produced by officials to have been unsatisfactory in point of the gold production of British Columbia and the Yukon. Dredging operations have been interfered with by water shortage and both lode and placer mining has been affected by high costs. The closing of the Nickel Plate Mines is the culminating incident of a period which appears to have been marked by a constant decline. The resumption of shipments on the part of the Rossland Mines of the Consolidated Mining & Smelting Co., however, furnishes the silver, or should golden be used in this instance, lining to the cloud. Bullion is beginning to reach the Vancouver Office from Trail as a result.

### Victoria, B.C.

Dr. J. E. Dutcher, who has just returned from Cape Prince of Wales, where he has been with the Lost River Tin Mining Company in the capacity of medical attendant, reports that work is being undertaken on rather a large scale on this property. While it has been under development for some seventeen years only recently have considerable operations been initiated for the opening of the deposits. The shaft now is down 300 feet. In sinking it was necessary first to penetrate the tundra and afterwards the glacial ice, which is some feet thick. Incidentally Dr. Dutcher furnishes a side light on life in the far north when he says that supplies brought to the mine last October are still in use and that the eggs lately have been taking on rather too high a flavour. Eskimo labour, he states, is unsatisfactory. Those employed in the mine work spasmodically and lately have been becoming more than ever independent because of the high prices to be obtained for the skins of fur-bearing animals. As a fox skin brings the Eskimos from \$35 to \$40 and as some of them trap as many as from 75 to 80 in a season it is not hard to understand their disinclination to the work of the miner.

Referring to placer mining in Alaska, Milton B. Roper, of Nome, states that the production has fallen off chiefly owing to the high cost of transportation. Freight is \$19 a ton, lighterage \$13 a ton, and wharfage \$1.50 a ton. Coal in the yard is \$46 a ton, which makes gold mining practically prohibitive. Mr. Roper, who is interested in dredging, says that operations of this character are going ahead on a large scale where conditions are suitable. Among the miners and prospectors of the north, interest is being manifested in the possibilities of placer mining on the Siberian Coast.

There is a well established idea that there are possibilities on the land across the Behring Sea and Mr. Roper believes that, if restrictions now preventing the export of gold from Siberia except in small quantities, are removed there will be a considerable exodus of miners to that country. Mr. Roper's business in British Columbia is to inspect certain placer grounds situated in the vicinity of Kamloops and elsewhere along the Fraser River and its northeastern tributaries with the object of instituting dredging operations. He expresses the opinion that there are good openings in this country and that, if good ground is found, it will be more satisfactory than Alaskan work because there will be practically an all-year working season.

While the copper market remains in the doldrums the Consolidated Mining and Smelting Co. proceeds with the development of its Vancouver Island properties. On the Sunloch Group, Jordon River, there is diamond drilling in progress at present. At Quatsino Sound considerable exploratory and development work still is underway. It is the opinion of those in touch with the work that both these properties will become large producers and that it is likely they will be put on a shipping basis as soon as more stable conditions prevail in respect of the world's copper requirements. It may be said, incidentally in this connection, that the Company is experiencing no difficulty at present in finding the labour needed for the work in hand. This changed condition is common to the mining camps of the entire Province.

**Prince George, B.C.**

The Cariboo District of British Columbia looks forward to an early revival of the placer mining industry. Barkerville has gone through a long period of extensive prospecting and hydraulicking by mining operators whose success has varied. Since the discovery on William Creek in the days of the Cariboo Gold excitement large sums of money have been spent in deep diggings between Quesnel and Barkerville by companies attempting to recover the gold from the gravels far below the creeks. The tremendous water pressure and difficulties of transportation have prevented any great success and attention now is being turned to a hunt for the Mother Lode which fed the rich placers of William and other adjacent Creeks. New York interests are said to have been favourably impressed by reports of engineers on the Barkerville field and are expected to commence dredging operations in that section. The Imperial Group of Claims, Proserpine Mountain, upon which a shaft has been sunk 21 feet, is reported to have shown up a vein carrying values averaging \$17 to the ton.

**THE COLLIERIES.**

The transfer of an area of 3,000 acres of coal bearing land situated in the Cedar District, Vancouver Island, for a figure aggregating a quarter of a million dollars is authentically reported. A number of British Columbia businessmen are the owners and, while the identity of the buyers has not been disclosed it is understood that they are undertaking to commence development with a view to the opening up of the coal seams and the establishment of a colliery without loss of time. The land carries bituminous coal of the same quality as that produced by other Vancouver Island coal mines.

Once more the City of Vancouver has taken umbrage over the cost of coal to the consumer. The Mayor of that City has taken the lead in protesting. Inquiries made by him are said to have led to the establishment of the fact that lignite can be imported to the Pacific Coast from the Province of Alberta and sold cheaper than is the bituminous coal of Vancouver Island and the interior British Columbia coal fields. The investigation now is in progress. The retail dealers have filed a statement of their case. They point first to their investment in Vancouver which runs to about \$2,000,000 and dwell on the unfairness of the municipality entering into the business in competition with them. They then show their costs to be \$13.41 per ton net, made up as follows: Price at the mines per ton net, \$8.93; towing per ton net, 67 cents; unloading scows, 50 cents; wear and tear on sacks, 25 cents per ton net; screening and sacking 50 cents per net ton; wharfage or average rent per ton, 20 cents; overhead, 75 cents per net ton; cartage and packing, \$1.50 per net ton. Their selling prices are \$15.00 per ton for lump and \$14 per ton for nut coal. The quality of the Alberta coal in comparison with that of this Province is attacked and it is asserted that the City would have to figure on selling run-of-the-mine coal at \$11.36 at the cheapest while run-of-the-mine coal is sold by them at \$11.50, so that there would be a saving of only 14 cents a ton for an inferior quality of fuel.

The production of the Vancouver Island, (B.C.) Collieries for the month of October shows a marked increase. It is apparent that all the Companies are speeding up their output in order to meet the increased domestic and bunker demands. Perhaps the most remarkable advance is in the case of the Cassidy Collieries of the Granby Consolidated Mining & Smelting Co. the production of which has jumped from 16,477 to 21,703 tons.

Following are the figures for the Island Collieries for the past month :

	Tons.
Canadian Western Fuel Co., Nanaimo, B.C.	60,582
Canadian Collieries (D) Ltd., Comox . . . .	43,390
Canadian Collieries, South Wellington . . . .	9,062
Canadian Collieries, Extension . . . . .	17,593
Pacific Coast Coal Mines Ltd., S. Wellington	7,610
Nanoose Wellington Collieries, Nanoose Bay	6,460
Granby Consolidated M. & S. Co., Cassidy . .	21,703

Total . . . . . 166,400

The production of the Crow's Nest Pass Coal Field, B.C. for the month of October was as follows:

	Tons.
Crow's Nest Pass Coal Co., Coal Creek . . . .	22,058
Crow's Nest Pass Coal Co., Michel . . . . .	11,504
Corbin Coal & Coke Co., Corbin . . . . .	14,678

Total . . . . . 48,240

**VANCOUVER MEETING OF THE CANADIAN INSTITUTE OF M. & M. FEBRUARY 1921.**

It has been decided to hold the Annual Meeting of the British Columbia Division of the Canadian Institute of Mining and Metallurgy in Vancouver sometime in February 1921. An organising meeting has already been held, and definite particulars as to date will be shortly announced.

### LABOR AND WAGE CONDITIONS AT THE NOVA SCOTIA COLLIERIES.

The terms of agreement proposed by the leading coal companies of Nova Scotia, (see page 955 of last week's issue) were discussed by the Wage Scale Committee of the United Mine Workers in Truro during the week ending the 20th November.

Many of the delegates to the Convention were definitely instructed, by their locals to reject the agreement, which to this extent tied the hands of the Committee, and it has been decided to take a referendum vote of the members of the Union.

The President and Secretary of the Union were subjected to much criticism by the delegates, although there was a strong minority that supported their action at the Montreal Conference, and expressed the opinion that the men's representatives at Montreal had made the best bargain possible under the circumstances.

The extreme step of a strike is unlikely to be taken, the possibility of success being remote, higher wages not being a condition in the power of the operators to grant, even if attempted. The ability of the international funds to finance a strike in Nova Scotia has been very plainly stated by the international officers to be doubtful, seeing that in two States in the Union, West Virginia and Alabama, the U. M. W. of A. is engaged in a bitter fight that will test its resources to their utmost extent. In West Virginia, what is described by "Coal Age" as the "most critical situation in the country" now exists as the outcome of the attempt by the U. M. W. to unionize one of the last-remaining open-shop mining districts in the United States. The striking miners are now living in open tents, and the final outcome of the struggle, to again quote "Coal Age" will "depend upon human endurance." In Nova Scotia, the only principle now at stake is a question of wages. The international leaders and the local representatives in Nova Scotia have admitted the non-effect of the recommendations of the Royal Commission, and the continued force and existence of the agreement of January 1920. The conditions of trade, of coal-selling prices and of commodity prices, are admitted to have undergone a complete change since the Royal Commission made its award in the Summer, and, in any case, even under the different conditions of two months ago, it was apparent to those who were in touch with the facts that the recommendations of the Royal Commission contained suggestions that were impossible of fulfillment in practice, no matter what inclination to accept them might exist on either side. The miners definitely and very deliberately refused these recommendations.

Speaking to the delegates at Truro, the President of the Nova Scotia district said that it cost from \$4.60 to \$5.60 per ton to produce coal in Nova Scotia. In the United States, he stated, the men produce upwards of three tons per day per man employed. An increase of 27 per cent to them adds 40 cents per ton to the cost. In Nova Scotia an increase of 27 per cent would make the cost of coal \$1.25 per ton higher. Thirty-five per cent of the miners in the United States are day-paid workers, but in Nova Scotia from 65 to 70 per cent are day-paid hands.

The figures given by this union official are approximately correct, and it may be added that the production per man employed in Nova Scotia does not reach two tons per man per day, consequent upon the disproportionate number of day-paid workers.

The Federal Trade Commission in the United States has recently published the figures of cost and sales realization for 535 identical operators in general competitive regions in the United States, which shows an f.o.b. mine cost of coal of \$2.69 in June and \$2.72 in May 1920, or a mine cost of from two to three dollars per ton below that of the Nova Scotia collieries. It is interesting to note, also, from the standpoint of earning ability, that these mines worked only 17 days in May and 19 days in June, whereas the collieries in Nova Scotia worked every day, except holidays and Sundays.

The miners in Nova Scotia are naturally chagrined and disappointed, having for some months calculated on receiving a wage increase that was not an economic possibility even at the peak of currency inflation and coal value—as expressed in a fluctuating paper medium—and not having realized that the aspect of business has completely changed, and that with great rapidity. Actually, the miners are doing very well to hold what they have, and it is also very much to be doubted whether the limitation of the Nova Scotia coal markets which will result from the wage increase proffered—under duress—by the operators, and the resulting unemployment, will be found as profitable in gross earnings, as increased individual production at existing rates of wages.

At the time of writing, the action of the miners is overshadowed, and to some extent presumably sought to be forestalled, by a strike of the railwaymen of the Dominion Iron & Steel Company, and impending similar action by the railway employees of the Nova Scotia Steel Company. The railwaymen employed on the steel plants are demanding the application of the McAdoo award to their wages to the same extent that it was applied to the wages of the employees of the Sydney & Louisburg Railway, a railway line operated by the Dominion Coal Company. The railway employees within the steel plants proper have never been regarded as entitled to the status of main-line employees, their work including only shunting and switching operations connected with the internal operation of the plants. The railwaymen gave the Company only seven hours notice of intention to strike, but by the help of officials and volunteers it is hoped to save the blast-furnaces, coke-ovens, and other continuous-process equipment from the disastrous consequence that will follow a cessation of all movement of coal, coke and ore in the plant without opportunity to bank furnaces and arrange for a lay-off.

In view of the serious slackness of orders at the Sydney plant, the closing-down of the Scotia plant, and the likelihood of a curtailment of operations at the Dominion plant through lack of demand for plates, rails and other main products of the plant, the action of the railwaymen seems very ill-advised.

The General Manager of the Sydney Plant, Mr. E. P. Merrill, has issued the following statement, which sufficiently discloses the difficulties under which the Dominion Company is laboring. Under a condition of steel demand, which if not soon bettered, will advise the drastic curtailment of steel-ingot production at the Sydney plant, the policy of the railwaymen seems to have been hastily conceived, and decided upon in ignorance of the Steel Company's position. Mr. Merrill states.

"The public should know that there is an economic situation controlling the number of hours of work and the wages paid at the steel works at the present

time. The plant was not designed nor is it equipped to operate on the basis of an eight-hour day at cost that permits of reaching markets open to us.

“Our strongest competition is from the United States, where steel companies, prior to the war, accumulated large surpluses not subject to abnormal taxation, and which enabled them to install every known improvement and labor-saving device which made for lower costs and increased output. We have certain natural advantages in our geographical location, but we must have co-operation of employees and stockholders while we are building up our plant and our markets.

“For several months, in a declining market, we have sought business in all parts of the world, even offering rails in exchange for certain grades of ore and finished products to foreign governments on credits. Nothing has been left undone in an effort to keep all departments in operation, for we appreciate the need for employment and we know the value of maintaining our organization intact.

“The sooner the employees of the Dominion Steel and Dominion Coal Companies come to a realization of the honesty of our purpose to establish a permanent all-the-year-around industry in Cape Breton, the sooner will they participate in the benefits.

“It must be evident to the most unthinking that we will never approximate or establish such a condition as long as our men blindly follow advices of outsiders as to how our business shall be managed.

“The McAdoo schedule and the Chicago award may be all right when they can be passed along in increased passenger fares and freight rates, but we are in no such position.

“We looked upon our men as loyal employees and good citizens and it is disappointing to us that by their action they left us without means to protect our property.”

The blast furnace of the Nova Scotia Steel & Coal Co. at Sydney Mines, and the open-hearth plant there, have been closed down, and the works at New Glasgow will be operated on cold metal until trade conditions warrant the resumption of steel-ingot production at Sydney Mines. Some 400 men will be displaced.

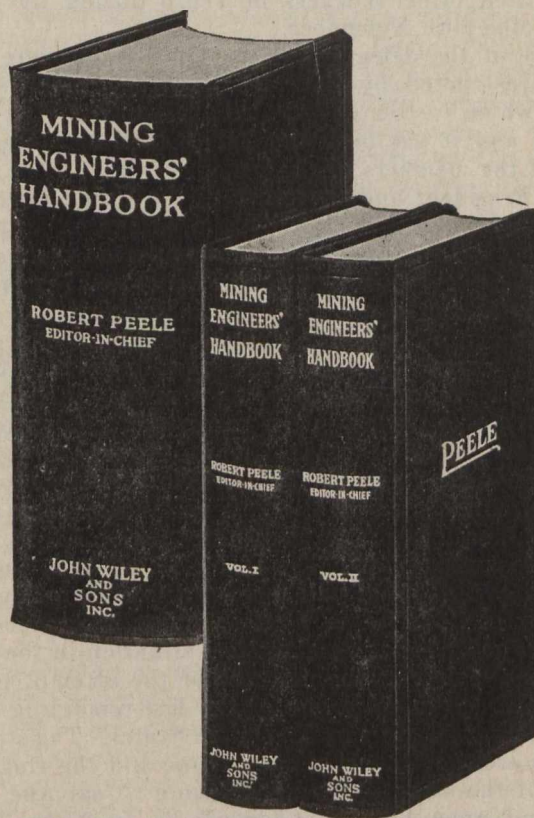
The production of the Glace Bay collieries of the Dominion Coal Company on the 18th November totalled 13,152 tons, this being the best individual day's output since January 1918.

**BASE METALS BEING USED IN EUROPEAN COINAGES.**

Samuel Montagu & Company's circular of 4th Nov. states that the mintage of base metal, other than copper or nickel, still prevails in Germany. Up to the end of August Mks. 53,300,000 of aluminium coins had been minted. Other coins minted up to the same date were iron coins, Mks 71,800,000, and zinc Mks. 56,800,000; so that in all about Mks. 181,200,000 of these coins of small denomination have been struck.

The "Times" Paris correspondent stated that the dies and metal for the new tokens, which are to replace the much-soiled 50c., 1 f. and 2 f. notes, are now ready, and the mint is only waiting the authority of the Chamber of Commerce of France, which is responsible for their issue.

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C.M.J.11-19-20



# Asbestos Mining in Australia

By HARTWELL CONDER.

(From Chemical Engineering & Mining Review, Melbourne).

The last five years have seen a development in a branch of mining which bids fair to win a permanent place as an economic producer. Asbestos has been known to exist in Australia since the days of early exploration. The demand, however, until recently, was almost solely for long fibre high-grade material, and nature had so arranged the distribution in Australia that the high-quality fibre—of wonderful length and texture—was located in the remote and sun-scorched vicinities of Marble Bar, in W.A., while the supplies within easy reach comprised fibre good enough in texture and tensile strength, but of average length well below the half-inch limit.

The introduction of asbestos sheeting has changed all that. It was found that by the addition of asbestos fibre to cement a product was obtained with the durability and other advantages of stone or slate, and yet with sufficient elasticity to withstand the ordinary rough usages of daily life. At first the rejected products of the Canadian mills were garnered and sold at low cost for this purpose, but the demand steadily increased, and freights and prices rose, so that it became of special interest to the Australian manufacturers to develop the supplies to be found at home. There is no lack of supplies, but considerable caution is necessary before expenditure is incurred in developing them. There are several forms of so-called asbestos. Mineralogically, true asbestos is a variety of hornblende; the commercial asbestos of Canada and Australia is a different mineral, and is known as chrysotile—almost pure hydrated silicate of magnesia. In composition it is identical with serpentine, with which it is invariably associated. When the vast intrusive masses of granite rocks commenced to cool, the more basic elements segregated along the margin to form distinctive rocks, such as gabbros, dolerites and others, grouped broadly under the name of ultra-basic rocks. Subjected to heat and the action of heated water vapor these rocks became altered—they lost iron and other elements and became hydrated, and serpentine is the name given to the final product. A soft, green, greasy rock, it is as widely distributed as the granites themselves; as a rule it does not carry minerals of economic value; chromite and magnetite accompany it, and in Tasmania it is the mother rock of the very valuable and extremely scarce osmiridium. In addition, it is the source of our supplies of asbestos.

The asbestos occurs in two forms. The first is found in the joints and selvages of the rock where in all probability local faulting has taken place. The fibres are parallel to the plane of the faulting, and may be over a foot in length, but they are coarse in texture and lacking in tensile strength. This class of fibre is known as picrolite or slip fibre, and is of little use for sheeting or similar purposes.

In the second form the mineral occurs in narrow veins or seams running through the solid rock, and the fibres are all arranged transversely to the seams. Where exposed to the sunlight even the smallest seam stands out distinct, like a ribbon of silk along the face of the rock. The fibres may be teased apart to a flossy mass,

and under the microscope the fine strands that compose this mass are seen to be bundles of finer and finer strands beyond the limits of even microscopic vision. It is this fine subdivision which gives the silky sheen when the light shines upon it, and which allows the better quality material to be spun into yarn and used for cloth.

Some interest has been shown lately in the manner in which this structure arises, and in the Transactions of the American Institute of Mining Engineers, Mr. Taber advances the theory that the fibres grow longitudinally as the crevice they form in opens. This theory does not appeal to the writer. Serpentine invariably shows the clearest signs of intense crushing and contortion. In the asbestos quarries both in Tasmania and in New South Wales local fault planes with slickensides occur at every angle and of every dimension. It is one of the main difficulties of working the ore, since at any point a good patch of ore may be cut off completely by a "head" coming either from the side or from below. With movements such as this taking place, cracks would develop in certain portions of the rock, to be instantly filled by the mobile solutions which were permeating the whole mass. It did not follow that chrysotile then formed from the solutions. In many places the rock is creviced through and through, but the crevices are filled with a green amorphous mineral with no sign of fibrous structure. The quality of the solution, and probably the rate of cooling, were determining factors, and when these were favorable the fibrous structure arose, even as the foliated structure of mica develops in the cooling granite itself.

The first treatment plant in Australia was erected under the writer's supervision near Beaconsfield, Tasmania, for the Durabestos Company, of Sydney. The asbestos occurs there in a serpentine belt lying between pre-silurian slates and Devonian granites. The geology has been described recently in Tasmanian Geological Survey Report No. 8, by A. McI. Reid. The plant was erected with considerable doubts as to the extent of ore available, but supplies were imperative, and this was then the source that offered most promise. There were many outcrops on the property, showing good fibre, but some considerable prospecting work had been done previously, and this work had shown that the ore bodies were of limited extent. It was realised that if the surface shows were attacked one by one and worked out singly, the property would soon be brought to a standstill. Effort was made, therefore, to open out a face where the fibre seemed most plentiful, and to carry this face right into the hillside, in order to expose other ore bodies at depth as the surface shows "petered out." It was hoped, too, that some system might be found to regulate the occurrences. The results were disappointing. No sign of system or method could be traced. The ore occurred in a hopelessly haphazard and erratic fashion. After some months working it became obvious that the hillside could not be taken in a face and that the ore bodies must be followed. This meant that the mine was doomed, and search was commenced for other supplies.

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The most promising and most accessible source proved to be in the New England district of N.S.W., on the western fall of the dividing range. From the granite mountains that form this range with Glen Innes perched high upon it, a stretch of broken, hilly country extends for over 50 miles till it merges into the western plains. The geology of this part of the country was dealt with by Dr. W. N. Benson, and the results of his work are published in the proceedings of the Linnean Society of N.S.W. He has shown that a great fault line extends in a direction about N.W., from a point about 20 miles N. of Tamworth, almost to Warialda, 100 miles away. The line passes about 12 miles east of Manilla and Barraba, and goes right through Bingara. Granite lies some distance away on the eastern side with a complex variety of rocks known as the eastern series stretching from it towards the fault line. Along the major portion of the fault line itself serpentines, gabbros, and other basic rocks are developed on the eastern side, and the serpentine in many places carries chrysotile asbestos.

The locality where the asbestos is most strongly developed is at Woodsreef, about 10 miles east of Barraba, and at that place quarries have been opened up and dressing plants erected by Messrs. Wunderlich and Messrs. James Hardie and Co., of Sydney. Messrs. Wunderlich had been interested in the Durabestos Co., which operated in Tasmania, and finally took over full control of this company. Their operations are briefly described here.

In the main features there is a close resemblance between the occurrence of the ore at Beaconsfield, Tasmania, and Woodsreef, N.S.W. Serpentine does not yield fertile soil, and its outcrop is marked by the stunted gum timber that battles for life upon it. Chromatite and magnetite are associated with it in both localities, some of the chromite patches having proved payable at Woodsreef. At both places the distribution of the fibre veins in the mother rock is most irregular and liable to sudden and total extinction, but the work done at Woodsreef leads to the conclusion that the distribution here is on a larger scale and of greater frequency. Weighed carefully in the light of the experience gathered in Tasmania, the mine here seemed to warrant a larger plant and to promise a good many years of profitable life. It would, however, prove a stumbling block to the engineer who aims at figuring out his ore reserves to the third figure in decimals. So far no practicable method of blocking out asbestos ore has been advanced. Even the diamond drill is useless, since the fibre fluffs up and chokes the bit.

To safeguard the position as far as possible, on Messrs. Wunderlich's property over a dozen quarries have been opened up, and these have been connected by tram with the mill. The mill itself is driven by a powerful Diesel engine, the fuel problem not being a simple one in these distant hills. The milling process is based on the Canadian practice, and depends first on crushing the rock with breaker and rolls to the size of peas. This product is then passed into a disintegrator, which pulverises the brittle rock to sand and beats out the fibre into fluff. From this machine the product is passed over shaking screens, at the lower end of which the mouth of a suction tube is brought down close to the surface. The fluff is caught up by the air current, carried away, and deposited in collecting bins. The process is not quite as simple as it sounds, since it is easy

both to lose fibre and to carry over an excess of useless sand, while the dust problem is always present. Fortunately, the soft serpentine dust appears to be free from the pernicious effects of the angular quartz particles, but care is taken to carry it off with fans, and keep the building as clear as possible. The disintegrating machine also is open to improvement. It is most difficult to devise a machine which will reduce the rock rapidly without damaging the fibre, and without excessive wear and tear. In Canada, where there was an excess of short fibre, the machines employed were most severe on the fibre; the ore was rich and a certain loss was compensated by large capacity and better quality product. With poorer ore in Australia the loss of fibre is a serious matter. A machine built in Sydney is installed in the present plant, and it is hoped it will prove successful.

The plant has been made, as far as possible, self-acting. The tram by which the ore is delivered to the bins curves round, so that there is a straight run through as the trucks are emptied. The mill is located so that a good gradient with the load is secured from nearly all the quarries. The tailings are passed out by conveyor, so that as little "shovel work" as possible is entailed.

The enterprise has brought fresh life and activity to a little way back township hidden among the hills which had already in the past had a brief experience of mining vitality from the alluvial gold that was worked there. Gold is still won in the vicinity, and there is talk of real lodes and large plants, but it is the asbestos that offers the immediate revival. How long such revival will last and how great a benefit it will bring to this part of the country must for the present remain unknown. This asbestos industry has, however, come to stay, and it is clear that the demand for the product will increase day by day as its merits become better known to architects and builders. It does not follow that every natural occurrence of asbestos has commercial value, but the stage has been reached when such occurrences are fully deserving of careful investigation, to decide whether in quantity and quality they may not prove profitable to the investigator, and useful to the men who are turning Australian minerals into Australian goods.

#### NEW COBALT DEPOSIT.

##### A Queensland Discovery.

The development of new uses of metallic cobalt in recent years has established a demand for this commodity, which a few years ago was a metal of comparatively small account. In the circumstances it becomes important to put on record any discoveries of new occurrences that give any promise of development to meet the world's requirements, and in this connection a report by the Queensland Government geologist recently received at the Imperial Mineral Resources Bureau concerning a high-grade deposit near Selwyn, in the Cloncurry district of Queensland, is of special interest.

The locality is approximately 19 miles south of Selwyn, the nearest railway station, which is 71 miles from Cloncurry. By track it is about 5 3/4 miles south of Mount Dore (located on Queensland four-mile map sheet 120) and one to two miles west of the Mort River.

The cobalt ore occurs at the contact of diorite (apparently a dyke about five chains wide) and schists,

the latter belonging to the Cloncurry series of supposed Silurian age. The schists have a strike of 5 degrees west of north and dip easterly at angles of 74 degrees to 80 degrees. They form noticeable outcrops on the area.

It is estimated that in prospecting the lode between 130 tons and 140 tons of ore have been raised, of which 92 tons represent ore in paddocks; 30 tons of the latter are approximately of 25 per cent. grade and the balance 10 per cent. to 12 per cent. grade. The lode is regular in its trend, following almost a straight line for at least 300 ft. It is very desirable, says the Government geologist, that the whole of the diorite contact should be prospected, particularly the eastern contact, on account of copper carbonates, scheelite and cobalt ores having been already found along it.

#### VANCOUVER BRANCH, C. I. M. M.

At a recent meeting of the Vancouver Branch of the C. I. M. M., it was decided to hold a luncheon early in November. This luncheon will be the first of a series of luncheons to be held during the Winter by this branch. It is proposed to make the meetings interesting, and have them prove a means of getting the members of the Vancouver branch together in a social way.

#### 1921 MINING CONVENTION, PORTLAND, OR.

Reports are coming from Portland, Ore., that the Chambers of Commerce are even now talking of the International Mining Convention which is to be held there during the coming Spring. Plans and ways and means are being discussed, and it is proposed to give the visiting delegates an interesting time. Vancouver will soon start some publicity work in connection with the coming convention, and the British Columbia Chamber of Mines proposes to take a most active part.



J. A. RICHARDS,  
Acting Chief Inspector of Mines, Alberta.

**BOOK REVIEW.**

The Efficient Purchase and Utilization of Mine Supplies: Stronek & Billyard. First Edition. John Wiley & Sons, New York. 5 by 7½ inches. Cloth Boards. 97 pp. No index. \$1.25.

This little book, written by two mining engineers, deals with two subjects that are not usually conjoined in mine operation, because the office of Purchasing Agent does not, generally, carry with it any supervision over the efficient utilization of the supplies that he purchases in his capacity as agent for his employers. The combination of clerical and purchasing ability with a practical knowledge of the use and upkeep of mine material is not often found, and in choosing a purchasing agent, consideration of the desirability of such dual equipment in the person selected might not be out of place.

The book gives a clear idea of the clerical equipment necessary, and lays properly great stress on the desirability of written requisitions and receipts for all material issued, although it is noted that the competent executive will know where to draw the line between useless red tape and proper system.

The treatment of the question of utilization of mine supplies contains useful hints, particularly with regard to hand-tools, the storage of oils and lubricants, timber preservation, treatment of pipelines, prevention of corrosion in iron and steel, fuel consumption, etc.

A department regarded as necessary by the authors, but only occasionally found at mines, is for testing materials received. In such items as oils and lubricants, wire-ropes, horse-feed, to mention a few typical things, some equipment for testing is necessary to check up the firms supplying material, nor is it necessary to assume that only large concerns can afford such equipment.

Another matter touched upon by the writers is that warehouses should be designed with track connections, handling devices and bin arrangements of substantial and permanent construction, designed to assist the economical storage and subsequent distribution of material.

**HANDBOOK OF ORE DRESSING.** Equipment and Practice. A. W. Allen, First Edition 1920. 7½ by 5 inches. 242 pages with Index. Limp leatherette backs. McGraw-Hill Co., New York.

This handbook is written by the author of "Mill & Cyanide Handbook", published by C. Griffin & Co., London, and previously reviewed in the "Canadian Mining Journal."

It deals with the various stages in the mechanical handling and preparation of an ore for metallurgical treatment. Amalgamation, concentration, flotation, chemical solution and smelting, are considered as essentially metallurgical processes, and as outside the scope of this treatise.

The introduction (from which we note the author's footnotes, the original presence of which is indicated in the text, have been omitted) discusses interestingly the proper definition of the term "ore-dressing" and its distinction from metallurgical extraction. We recollect that a legal question touching the application of taxation to mines in Northern Ontario turned on this distinction.

The treatise appears to be what its writer sets forth as his aim, namely, "a handy and practical vademecum for millmen and engineers." A bibliography is appended, and illustrations are numerous. Many statistical tables are also included.

**MINERALOGY**, by E. H. Kraus, Professor of Mineralogy and Crystallography, University of Michigan, and W. F. Hunt, associate Professor of Mineralogy and Petrography, University of Michigan. Published by McGraw-Hill Book Co., New York.

This book is written for the purpose of helping the student to grasp the fundamentals of the science of mineralogy. It is obviously intended to be used as a handbook in a laboratory where specimens of the minerals are available for study and which is equipped with simple apparatus for easily applied tests. It should serve as a useful text-book for elementary classes in mineralogy. It deals specifically with 150 common minerals, but should help to give the student a good groundwork for the study of any other minerals as well as assist him in determining the 150 described in the text.

The authors have advisedly laid stress on the physical properties of minerals. It is by the easily determined physical properties that most minerals are identified. The less easily understood subject of crystallography is however given prominence because of the highly distinctive character of the crystallization of minerals.

As the ordinary student in our colleges knows little about crystallography or the optical properties of crystals, the authors have necessarily presented these subjects at some length. They have endeavored to simplify these matters for the student by using large numbers of illustrations, including numerous excellent photographs of minerals and crystal models. The information given in the text, when used in conjunction with laboratory study of crystals and crystal models should make easy the acquirement of the rudiments of crystallography and its application in the identifying of minerals.

For the determination of minerals simple blow-pipe tests are in many cases used to advantage. The authors of this book have presented an excellent description of blow-pipe methods that require only simple apparatus and a few reagents.

In the descriptions of minerals, the authors have chosen a logical arrangement and grouping that commends itself to the reader and should help the student to keep in his mind. Chief attention has been devoted to characteristics which are useful in identifying minerals, mention is made of the economic uses and value of the various minerals and some of the districts in which ores are mixed are noted.

The ways in which minerals have been formed are dealt with in one chapter. Some description is given also of the common rocks. The student is also given some idea of the methods of utilizing the polarizing microscope for the examination of minerals.

To assist in the determination of the common minerals a very complete set of tables is presented. With these tables the student can utilize readily determinable physical properties in identifying specimens. Just how satisfactory these tables are for the purpose can be determined only by frequent use. Knowing the authors I would expect these tables to be the result of long experience and to have been well tested and found very satisfactory.

The book differs in many respects from the ordinary text-books on mineralogy. It is not a mere descriptive text or a dissertation on the science of mineralogy; but rather a book with a purpose: to give the student a grasp of fundamentals of the subjects and to arouse his interest in minerals and ores and in the industries in which they play a large part.—R. E. H.

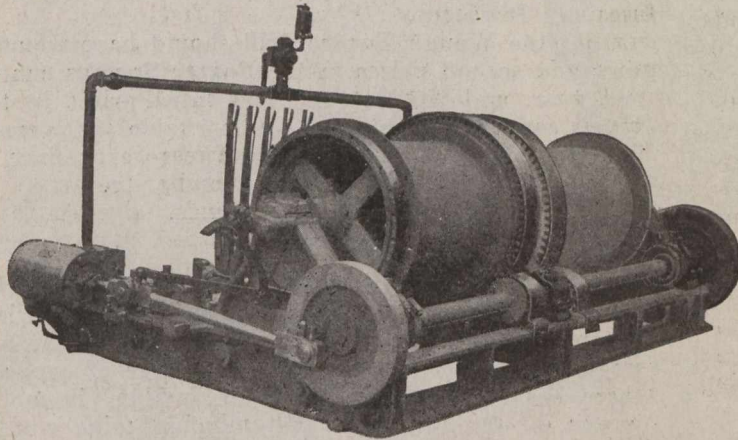
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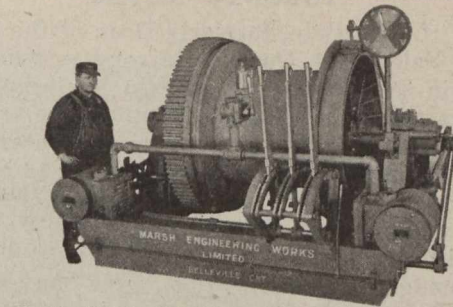
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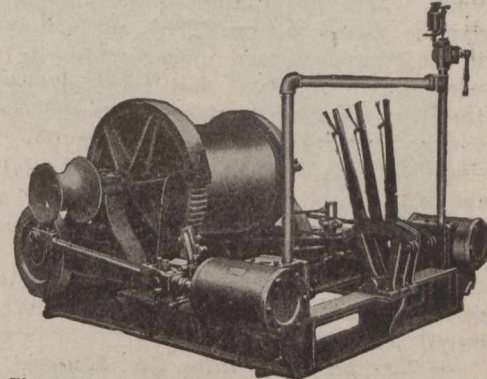
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**MINE GASES AND VENTILATION.**—Text-book for students of Mining, Mining Engineers and Candidates preparing for Mining Examinations. J. T. Beard, Second Edition. 5½ by 8 inches. Limp leatherette backs. 433 pages with index. McGraw-Hill Co., New York, \$4.00.

Mr. Beard's connection with the International Correspondence Schools, and with "Mines and Minerals" is well-known to coal-mining students. As Senior Associate Editor of "Coal Age". Mr. Beard prepared a series of study courses in coal mining, with the intention of their inclusion and later publication as a pocket book. The present volume is issued in request to many applications for immediate publication, and it is, as stated in the preface, a very handy volume for mining students, dealing simply with one of the subjects in a coal-mining course that usually gives most worry to the aspirant to a certificate of competency and official position.

The volume treats on the physical phenomena of atmospheric air, heat, mine gases, mine explosions, mine rescue-work and appliances, the theory and practice of ventilation, mine lamps and lighting, and contains an addenda of useful tables.

The volume is, of course, written from the standpoint of United States practice, which in many respects connected with mine explosives, the use of electricity in mines, mine illumination and the use of explosives, permits practices that are not allowed in Canadian or European collieries.

Mr. Beard's viewpoint, is however, in advance of the practice of his country.

## MINERAL RIGHTS OF ESQUIMALT AND NANAIMO RAILWAY BELT, B.C.

For some months negotiations have been in progress between the British Columbia Department of Mines and the representatives of the Esquimalt and Nanaimo Railway. Co. for the settlement of the unsatisfactory condition now prevailing as to the administration of the minerals within what is known as the Railway Belt on Vancouver Island, an area of 3,396.9 square miles. In this section the Company owns the surface and the base metals and the Government the gold and silver and there are the Railway Company's regulations and the Provincial Mineral Act to be complied with before title to the minerals can be obtained or even recorded effectively. The result has been the retarding of mining development in that region. After extended discussion, and exchange of views, the Government has made a proposition to the Company which may be summarized as follows:

"That, as regards the mineral rights within the E. & N. Railway Belt remaining unalienated, the Government is prepared practically to go 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 administration 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 railway company."

**TORONTO NOTES.**

Dr. W. L. Goodwin, formerly Dean of the Faculty of Applied Science at Queens University, Kingston, has arrived in Toronto. Dr. Goodwin has been requested to act as principal and has accepted the task in connection with the establishment by the Ontario Department of Mines, of schools of instruction at the various mining centres. It is expected that the schools will be at Belleville, Madoc, Cobalt, Porcupine, Fort William and Sault Ste. Marie.

Oil boring operations will be carried on all winter in Alberta and Saskatchewan by ten rigs of Imperial Oil, Limited, according to an announcement by President A. W. McQueen, who has just returned to Toronto from the West, where he completed arrangements for the continuance of operations. This will embrace all the rigs of the company now operating in the West, with the exception of the two that were in the Fort Norman territory of the far north, where the weather is too severe for winter work. No further announcement has been made as to results in the latter section as work was closed down for the winter some time ago. The continuance of boring in the more southerly regions may bring announcement of success in other places in the course of the winter months. In any case the company's program in the West is being prosecuted with vigor.

**Thompson Powder Co., Limited.**

The mining industry generally will be interested in learning of the progress that is being made at the plant of the Thompson Powder Company, Limited, manufacturers of high explosives at Deseronto, Ont. A new magazine has been erected which will hold several carloads of the finished product and one of the buildings is in readiness for the reception of over fifty tons of raw material, which will at once be hauled to the power house. Other buildings have been remodelled and site cleaned up. The Hydro line will be strung during November. Motors and other machinery have been ordered and it is expected that before long the plant will be in active operation. The company are the manufacturers of "Thompsonite" an explosive which, it is claimed, throws off no noxious fumes and does not require thawing in the coldest weather. It is claimed, also, that the inventor has perfected a powder which is stronger by at least fifteen per cent than any explosive now in use in Canada. The powder is said not to be affected by water, does not leak or crystallise out and does not contain nitro-glycerine, making it safe to handle and manufacture.

**JOPLIN DISTRICT ROCK DRILLING CONTEST.**

Down in Baxter Springs, Kansas, in the Joplin District, they have an annual Fall Festival at which the drawing card and most exciting event is a rock drilling prize contest, which, as a true criterion of men and machines, closely approaches the ideal contest. The contest was held this year on October 20th.

Teams are required by the rules of this contest to set up tripods; connect hose to drill; drill hole clear through rock; tear down drill; disconnect hose; loosen bolts; and place hose, steel, drill, and tripod back in position where found.

The rock used last year was a block of Carthage marble five feet square, marked off into twelve square spaces, one space being reserved for each drilling team, while this year a block of concrete, six feet thick and filled with boulders, was used.

Miles and Vickery, who carried off the first prize

last year with the Waugh Turbro drill, were just one minute behind Abbott and Mitchell, the team that won the first prize this year. Both teams operated the Waugh Turbro drill, as did also Santon and Cox winners of the third prize in this year's contest.

The drilling time for the first three teams including setting up, tearing down, etc., was as follows: First, 4 minutes 26½ seconds; Second, 4 minutes, 27½ seconds; Third, 5 minutes 4½ seconds. The nearest competitor of the three winning teams, operating another make of drill, completed their hole in 7 minutes 4½ seconds. Last year the winning time in this contest was 5 minutes and 16 seconds.

That the Waugh Turbro drill should have won the first and second prizes in the Baxter Springs contest last year, and first, second and third prizes in this year's contest is considered a remarkable achievement in the Joplin district where the Turbro ever since its introduction has enjoyed great popularity.

**COAL PRICES.**

Toronto, November 25.—Local dealers report that there are indications of a recession in anthracite prices. Business is exceedingly dull. The storms of the past week resulted in a still greater shortage of cars and there has been a considerable reduction in motive power on the railroads. Bituminous mine run is quoted at from \$9.25 to \$10.50 with good grade slack at \$9.50. Smokeless is quoted at from \$10 to \$10.75. Bituminous lump continues to be scarce and hard coal is ruling at from \$8 to \$14.

**Montreal.**

Boston News Bureau states drop in bituminous prices in United States has been a collapse of the spot market rather than any serious reduction in contract prices. This is what would be expected, as unconscionable increases which took place in United States coal during the Summer were for "spot" coal; the mines, by some process best known to themselves, managing to hold back on contract deliveries and avail themselves of spot coal prices. Prices for good grade bituminous steam are stated to vary from \$4.25 to \$6.00 per ton, at the pitmouth an average of \$5.00 being representative.

Tendency to substitute bituminous for anthracite is noticeable in the New England States, and it is further stated that large demand for anthracite from the Middle West which was simultaneous with high wages there is now falling off, and that bituminous coal is being once more generally used. The status of anthracite as a "luxury" fuel, but not an indispensable one where bituminous coal is available, is becoming established.

Statistics just compiled indicate that the British Columbia Department of Mines, in carrying out the policy enunciated by the Mineral Survey & Development Act of extending assistance in the construction of roads and trails to mining properties favorably reported upon by government engineers, has built and maintained, between the years 1917 and 1920 inclusive, a total of 3,901.95 of such roads and trails in different parts of the Province. These figures are interesting as showing that the mining industry has not been dormant in the Canadian West in recent years and that considerable work has been done towards the opening up of new mineralized areas.



The ancient Greek and Roman both recognized the primary principle of grinding as crushing a smaller, softer object with a heavier, harder one. These super-men endowed with their marvelous physique, hurled huge boulders against smaller and softer stone. With this slow method, they reduced such minerals as quartz and limestone to powder form.

This first recognized grinding principle, improved and marshalled into commercial force by modern engineering science, is the basis of the Hardinge Conical Mill. When one considers that an 8-ft Hardinge Ball Mill can grind more in a day than a legion of early Greeks and Romans could in a week, the part modern engineering science has played is very impressive.

The Mill contains 3600 steel balls of various sizes which strike the material being ground at an average of 90,000 times a minute exerting a reduction force of approximately 360,000ft. lbs. of energy. Due to the conical shape of the Hardinge Mill, coarse material, on entering immediately gravitates to the point of greatest diameter. There it comes in contact with the largest balls traveling at the highest speed and striking with the greatest impact. As the particles are gradually broken they flow toward the narrower end meeting the smaller and lighter balls. The material undergoing reduction reaches the required degree of fineness and the discharge end simultaneously.

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# Hardinge Conical Mills

## Port Arthur Notes

By J. J. O'CONNOR.

The recent announcement of Thos. W. Gibson, Deputy Minister of Mines, that Mining Schools for prospectors would be opened at suitable mining centres during the coming Winter, has been received throughout Northern Ontario with general satisfaction, by all classes interested in the development of the immense area of unprospected territory, of which we know so little.

In the light of the mineral development that has taken place in Northern Ontario during the past ten years, there is no more inviting field for the intelligent well informed prospector, than is afforded in the unprospected areas of Northern Ontario. The vast triangular expanse of country, bounded on the south by the settlements of agriculturists, and the cities of Port Arthur and Fort William, on the east by Lake Nepigon, on the north by the Canadian National Railway, thousands of square miles in extent, is practically untrampled and unknown to the prospector. Similar extensive tracts of promising stretches of country lie east of Lake Nepigon, almost wholly unprospected. While north of the Canadian National Railway, (Transcontinental) we know no more of today, than we did in the days of the pioneer fur-traders.

These virgin fields are beckoning the well equipped prospector, offering opportunities of gaining splendid rewards for their time and labour.

The Hon. Mr. Mills, Minister of Mines, is to be highly commended for affording facilities that will be within the reach of all interested, to fully equip themselves at a season when their ordinary field work is restricted. It is to be hoped that many will avail themselves of this splendid opportunity, and that the pack-sack, the pick and the frying-pan, may be familiar sights on the trails and portages of the North, during the coming summer.

It has long been felt that a Mining Commissioner, familiar with, and competent to direct publicity, covering the mineral areas of Northern Ontario, would be of substantial advantage to this section, in making known its possibilities, to the investing public. The advantage the Province of Manitoba has received from the employment of an official of this character, is acknowledged by all mining men, and furnishes a good precedent for Ontario to follow.

The steamer J. Frater Taylor, of the Algoma Central Steamship Line, cleared for Buffalo, on the 16th instant, with the last cargo of pyrites for the season. This cargo completes a total shipment of slightly over 100,000 tons for the season of 1920, from the Northern Pyrites Mines, at Northpines, Ontario.

**SILVER-GALENA MINE**—For sale limited number One Dollar shares in Yukon Silver-Lead Mining Company, incorporated under laws Yukon Territory, operating Lookout Mountain Claim in Mayo District of Yukon Territory, Canada, has option on five claims adjoining. Capitalised for \$250,000. Bona fide opportunity. Geo. F. Johnson, 817 South El Molino Ave., Pasadena Calif.



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C. X. L. Technical Service is always at your disposal, to help solve your blasting problems.

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Ottawa	Edmonton	Victoria	Prince Rupert
Cobalt	Sudbury	Winnipeg	Vancouver
		Nelson	

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Vaudreuil, Que.	Nanaimo, B.C.
Windsor Mills, Que.	Northfield, B.C.
Parry Sound, Ont.	Bowen Island, B.C.



# 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  
Lefoux & Co.  
Thos Hey & 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—Hessner:**

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



# 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.

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.  
Fraser & Chalmers of Canada, Ltd.  
Mussens, Limited  
R. T. Gilman & Co.  
The Wabi Iron Works

**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.  
The Wabi Iron Works

**Carriers (Gravity):**

Jones & Glassco

**Castings—Brass**

The Canada Metal Co., Ltd

**Castings (Iron and Steel)**

Burnett & Crampton  
Canadian Steel Foundries, Ltd.  
Hull Iron & Steel Foundries, Ltd.  
Osborn, Sam'l (Canada) Limited.  
Peacock Brothers Limited.  
The Electric Steel & Metals Co.  
The Wabi Iron Works

**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.

**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:**

Osborn, Sam'l (Canada) Limited.  
Sullivan Machinery Co.  
Canadian Ingersoll-Rand Co., Ltd.

**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  
Mussens, Limited  
R. T. Gilman & Co.

**Coal and Coke Handling Machinery**

Canadian Mead-Morrison Co., Limited.  
Canadian Link-Belt Co., Ltd.

**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  
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.

**Concentrating Tables:**

The Mine & Smelter Supply Co.  
Deister Concentrator Co.  
The Wabi Iron Works

**Converters:**

Northern Canada Supply Co.  
MacGovern & Co., Inc.

**Conveyors—McCaslin Gravity Bucket:**

Canadian Mead-Morrison Co., Limited.

**Contractors' Supplies:**

Canadian Fairbanks-Morse Co., Ltd.

**Consulters and Engineers:**

Hersey Milton Co., Ltd.

**Conveyors:**

Canadian Link-Belt Co., Ltd.  
The Mine & Smelter Supply Co.  
Jones & Glassco (Regd.)

**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.  
The Wabi Iron Works

**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  
R. T. Gilman & Co.  
Smart-Turner Machine Co.

**Crane Ropes:**

Allan Whyte & Co.  
Canada Wire & Cable Co.  
Greening, B., Wire Co., Ltd.

**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.  
Swedish Steel & Importing Co., Ltd.

**Crushers:**

Canadian Fairbanks-Morse Co., Ltd.  
Canadian Steel Foundries, Ltd.  
Hull Iron & Steel Foundries, Ltd.  
Hardinge Conical Mill Co.  
Osborn, Sam'l (Canada) Limited.  
The Electric Steel & Metals Co., Ltd.  
R. T. Gilman & Co.  
Lyman, Ltd.  
Mussens, Limited

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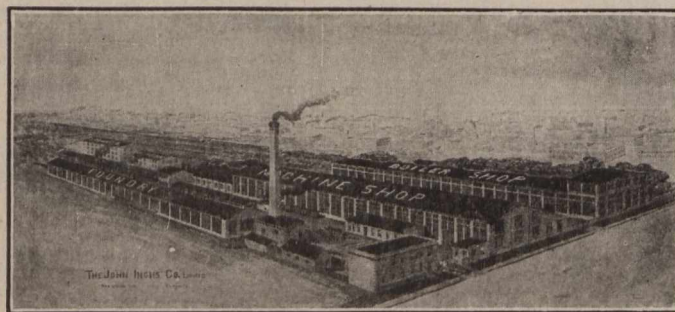
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J. W. ANDERSON, 7 Bank Street, CHAMBERS

## Canadian Miners' Buying Directory.—(Continued)

- The Mine & Smelter Supply Co.  
Hadfields, Limited  
Fraser & Chalmers of Canada, Ltd.  
The Wabi Iron Works
- Cut Gears:**  
Hans Renold of Canada, Limited, Montreal, Que.
- Cyanide:**  
American Cyanamid Company.
- Cyanide Plant Equipment:**  
The Dorr Co.  
The Mine & Smelter Supply Co.
- D. C. Units:**  
MacGovern Co.
- Derricks:**  
Smart-Turner Machine Co.  
Canadian Mead-Morrison Co., Limited.  
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.  
Canadian Mead-Morrison Co., Limited  
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.  
Osborn, Sam'l (Canada) Limited.  
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—Mining:**  
H. A. Drury Co., Ltd.  
Hadfields, Limited  
International High Speed Steel Co., Rock  
Osborn, Sam'l (Canada) Limited.  
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.  
Osborn, Sam'l (Canada) Limited.  
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.  
Osborn, Sam'l (Canada) Limited.  
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
- Ejectors:**  
Canadian Fairbanks-Morse Co., Ltd.  
Canadian Ingersoll-Rand Co., Ltd.  
Northern Canada Supply Co.
- Elevators:**  
Canadian Mead-Morrison Co., Limited.  
Canadian Link-Belt Co., Ltd.  
Sullivan Machinery Co.  
Northern Canada Supply Co.  
Hadfields, Limited  
Fraser & Chalmers of Canada, I  
Jones & Glassco (Regd.)  
Mussens, Limited  
The Wabi Iron Works
- Engineering Instruments:**  
C. L. Berger & Sons
- Engines—Automatic:**  
Canadian Fairbanks-Morse Co., Ltd.  
Canadian Mead-Morrison Co., Limited  
Fraser & Chalmers of Canada, Ltd.
- Engines—Gas and Gasoline:**  
Canadian Fairbanks-Morse Co., Ltd.  
Alex. Fleck  
Fraser & Chalmers of Canada, Ltd.  
Osborn, Sam'l (Canada) Limited.  
Sullivan Machinery Co.  
Gould, Shapley & Muir Co., Ltd.  
MacGovern & Co., Inc.  
The Mine & Smelter Supply Co.
- Engines—Haulage:**  
Canadian Ingersoll-Rand Co., Ltd., Mort.  
Canadian Mead-Morrison Co., Limited.  
Marsh Engineering Works  
Fraser & Chalmers of Canada, Ltd.
- Engines—Marine:**  
Canadian Fairbanks-Morse Co., Ltd.  
MacGovern & Co., Inc.  
Swedish Steel & Importing Co., Ltd.
- Engines—Steam:**  
Canadian Fairbanks-Morse Co., Ltd.  
Canadian Mead-Morrison Co., Limited.  
R. T. Gilman & Co.  
MacGovern & Co., Inc.  
Fraser & Chalmers of Canada, Ltd.
- Engines—Stationary:**  
Swedish Steel & Importing Co., Ltd.
- 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:**  
Spielman Agencies, Regd.
- Flood Lamps:**  
Northern Electric Co., Ltd.
- Flourspar:**  
The Consolidated Mining & Smelting Co.  
Everitt & Co.
- Forges:**  
Canadian Fairbanks-Morse Co., Ltd.  
Northern Canada Supply Co.
- Forging:**  
Canadian Mead-Morrison Co., Limited.  
Canadian Foundries and Forgings, Ltd.  
Hull Iron & Steel Foundries, Ltd.  
Smart-Turner Machine Co.  
Hadfields, Limited  
Fraser & Chalmers of Canada, Ltd.
- Frogs:**  
Canadian Steel Foundries, Ltd.  
Hull Iron & Steel Foundries, Ltd.  
John J. Gartshore
- Frequency Changers:**  
MacGovern & Co., Inc.
- Furnaces—Assay:**  
Canadian Fairbanks-Morse Co., Ltd.  
Lymans, Limited  
Mine & Smelter Supply Co.
- Fuse:**  
Canadian Explosives  
Giant Powder Company of Canada, Ltd.  
Northern Canada Supply Co.
- 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 Fairbanks-Morse Co., Ltd.  
Canadian Steel Foundries, Ltd.  
The Electric Steel & Metals Co.  
The Hamilton Gear & Machine Co.  
Fraser & Chalmers of Canada, Ltd.  
The Wabi Iron Works
- Granulators:**  
Hardinge Conical Mill Co.
- Grinding Wheels:**  
Canadian Fairbanks-Morse Co., Ltd.
- Gold Refiners**  
Goldsmith Bros

## Canadian Miners' Buying Directory.—(Continued)

**Gold Trays:**

Canada Chicago Bridge &amp; 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.  
Osborn, Sam'l (Canada) Limited.  
Hadfields, Limited  
International High Speed Steel Co., Rockaway.**High Speed Steel Twist Drills:**Canadian Fairbanks-Morse Co., Ltd.  
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 Fairbanks-Morse Co., Ltd.  
Canadian Rock Drill Co.  
Denver Rock Drill Mfg. Co., Ltd.  
Jones & Glasco  
Canadian Mead-Morrison Co., Limited.  
Marsh Engineering Works  
Northern Canada Supply Co.  
Mine & Smelter Supply Co.  
Fraser & Chalmers of Canada, Ltd.  
The Electric Steel & Metals Co.  
The Wabli Iron Works  
R. T. Gilman & Co.  
Mussens, Limited  
Canadian Link-Belt Co., Ltd.**Hoisting Engines:**Canadian Fairbanks-Morse Co., Ltd.  
Canadian Rock Drill Co.  
Denver Rock Drill Mfg. Co., Ltd.  
The Electric Steel & Metals Co.  
Mussens, Limited  
Sullivan Machinery Co.  
Canadian Ingersoll-Rand Co., Ltd.  
Canadian Mead-Morrison Co., Limited  
Marsh Engineering Works  
Fraser & Chalmers of Canada, Ltd.  
The Mine & Smelter Supply Co.**Hoisting Towers:**

Canadian Mead-Morrison Co., Limited.

**Hose:**Canadian Fairbanks-Morse Co., Ltd.  
Gutta Percha & Rubber, Ltd.  
Northern Canada Supply Co.**Hose (Steam, Air, Water):**

Gutta Percha &amp; Rubber, Ltd.

**Hydraulic Machinery:**Canadian Fairbanks-Morse Co., Ltd.  
Hadfields, Limited  
MacGovern & Co., Inc.  
Fraser & Chalmers of Canada, Ltd.  
The Wabli Iron Works**Industrial Chemists:**

Hersey, M. &amp; Co., Ltd.

**Ingot Copper:**Canada Metal Co., Ltd.  
Hoyt Metal Co.**Insulating Compounds:**

Standard Underground Cable Co. of Canada, Ltd.

**Inspection and Testing:**

Dominion Engineering &amp; Inspection Co.

**Inspectors:**

Hersey, M. &amp; Co., Ltd.

**Jacks:**Canadian Fairbanks-Morse Co., Ltd.  
Can. Brakeshoe Co., Ltd.  
Northern Canada Supply Co.  
R. T. Gilman & Co.  
Mussens, Limited**Jack Screws:**

Canadian Foundries and Forgings Ltd.

**Laboratory Machinery:**

Mine &amp; Smelter Supply Co.

**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**Lamps:**

Dewar Manufacturing Co., Inc.

**Lanterns—Electric:**

Spielman Agencies, Regd.

**Lead (Pig):**The Canada Metal Co., Ltd.  
Consolidated Mining & Smelting Co.  
Hoyt Metal Company.**Levels:**

C. L. Berger &amp; Sons

**Locomotives (Steam, Compressed Air and Storage Steam):**Canadian Fairbanks-Morse Co., Ltd.  
H. K. Porter Company  
R. T. Gilman & Co.  
Fraser & Chalmers of Canada, Ltd.  
Mussens, Limited**Link Belt**Canadian Fairbanks-Morse Co. Ltd.  
Canadian Link-Belt Co., Ltd.  
Northern Canada Supply Co.  
Jones & Glasco**Machinists:**

Burnett &amp; 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.  
The Electric Steel & Metals Co.  
Hadfields, Limited  
Osborn, Sam'l (Canada) Limited.  
Hull Iron & Steel Foundries, Ltd.  
Fraser & Chalmers of Canada, Ltd.  
The Wabli 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 Durr Co.**Metallurgical Machinery:**General Engineering Co., New York  
The Durr Co.  
The Mine & Smelter Supply Co.**Metal Work, Heavy Plates:**

Canada Chicago Bridge &amp; Iron Works

**Mica:**Everitt & Co.  
Diamond Drill Carbon Co.**Mining Engineers:**

Hersey, M. Co., Ltd.

**Mining Drill Steel:**H. A. Drury Co., Ltd.  
Osborn, Sam'l (Canada) Limited**Mining Requisites:**International High Speed Steel Co., Rockaway, N. Y.  
Canadian Steel Foundries, Ltd.  
Dominion Wire Rope Co., Ltd.  
Hadfields, Limited  
Osborn, Sam'l (Canada) Limited.  
Hull Iron & Steel Foundries, Ltd.  
Fraser & Chalmers of Canada, Ltd.  
The Electric Steel & Metals Co.  
The Wabli Iron Works**Mining Ropes:**

Dominion Wire Rope Co., Ltd.

**Mine Surveying Instruments:**

C. L. Berger &amp; Sons

**Molybdenite:**

Everitt &amp; 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 Wabli Iron Works

## Canadian Miners' Buying Directory.—(Continued)

**Motor Generator Sets—A.C. and D.C.**  
MacGovern & Co.

**Nails:**  
Canada Metal Co.

**Nickel:**  
International Nickel Co.  
Coniagas 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 Mead-Morrison Co., Limited.  
Canadian Link-Belt Co., Ltd.

**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.  
Hoyt Metal Co.  
Everitt & Co.  
Pennsylvania Smelting Co.

**Packing:**  
Canadian Fairbanks-Morse Co., Ltd.  
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.

**Permissible Explosives:**  
Giant Powder Company of Canada, Ltd.

**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:**  
Canadian Fairbanks-Morse Co., Ltd.  
Canada Metal Co., Ltd.  
Consolidated M. & S. Co.  
Northern Canada Supply Co.  
R. T. Gilman & Co.

**Pipe Fittings:**  
Canadian Fairbanks-Morse Co., Ltd.

**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.

**Powder:**  
Giant Powder Company of Canada Ltd.

**Prospecting Mills and Machinery:**  
The Electric Steel & Metals Co.  
E. J. Longyear Company  
Standard Diamond Drill Co.  
Mine & Smelter Supply Co.  
Fraser & Chalmers of Canada, L.  
The Wabi Iron Works

**Pumps—Pneumatic:**  
Canadian Fairbanks-Morse Co., Ltd.  
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.  
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.  
The Wabi Iron Works

**Pumps—Vacuum:**  
Canadian Fairbanks-Morse Co., Ltd.  
Smart-Turner Machine Co.  
The Wabi Iron Works

**Pumps—Valves:**  
Canadian Fairbanks-Morse Co., Ltd.

**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.  
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.  
Fraser & Chalmers of Canada, Ltd.  
The Wabi Iron Works

**Pumps—Diaphragm**  
The Dorr Company

**Pumps—Electric**  
Canadian Fairbanks-Morse Co., Ltd.  
Fraser & Chalmers of Canada, Ltd.  
Mussens, Limited  
Smart-Turner Machine Co.

**Pumps—Sand and Slime:**  
Canadian Fairbanks-Morse Co., Ltd.  
Fraser & Chalmers of Canada, Ltd.  
Mine & Smelter Supply Co.  
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.

**Balls:**  
Hadfields, Limited  
John J. Gartshore  
R. T. Gilman & Co.  
Mussens, Limited

**Railway Supplies:**  
Canadian Fairbanks-Morse Co., Ltd.

**Refiners:**  
Goldsmith Bros.

**Riddles:**  
Hendrick Mfg. Co.

**Roller Chain:**  
Hans Renold of Canada, Limited, Montreal, Que.  
Canadian Link-Belt Co., Ltd.

**Roofing:**  
Canadian Fairbanks-Morse Co., Ltd.  
Northern Canada Supply Co.

**Rope—Manilla:**  
Osborn, Sam'l (Canada) Limited.  
Mussens, Limited

**Rope—Manilla and Jute:**  
Jones & Glassco  
Northern Canada Supply Co.  
Osborn, Sam'l (Canada) Limited.  
Allan, Whyte & Co.

## Canadian Miners' Buying Directory.—(Continued)

**Rope—Wire:**

Allan, Whyte & Co., Ltd.  
Canada Wire & Cable Co.  
Deminion 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.

**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.  
Canadian Steel Foundries, Ltd.  
Fraser & Chalmers of Canada, Ltd.  
Osborn, Sam'l (Canada) Limited.  
Hull Iron & Steel Foundries, Ltd.  
The Electric Steel & Metals Co.  
Hadfields, Limited  
The Wabi Iron Works

**Steel Drills:**

Canadian Fairbanks-Morse Co., Ltd.  
Canadian Rock Drill Co.  
Denver Rock Drill Mfg. Co., Ltd.  
Sullivan Machinery Co.  
Northern 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.  
Osborn, Sam'l (Canada) Limited.  
Mussens, Limited  
R. T. Gilman & Co.  
The Wabi Iron Works

**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:**

Canadian Steel Foundries, Ltd.  
Mussens, Limited.

**Switches and Turntables:**

John J. Gartshore

**Tables—Concentrating:**

Mine & Smelter Supply Co.  
Fraser & Chalmers of Canada, Ltd.  
The Electric Steel & Metals Co.

**Tanks:**

R. T. Gilman & Co.

**Tanks—Acid:**

Canadian Chicago Bridge & Iron Works  
The Mine & Smelter Supply Co.

**Tanks (Wooden):**

Canadian Fairbanks-Morse Co., Ltd.  
Gould, Shapley & Muir Co., Ltd.  
Pacific Coast Pipe Co., Ltd.  
Mine & Smelter Supply Co.  
The Wabi Iron Works

**Tanks—Cyanide, Etc.:**

Hendrick Mfg. Co.  
Pacific Coast Pipe Co.  
MacKinnon Steel Co.  
Fraser & Chalmers of Canada, Ltd.  
Mine & Smelter Supply Co.  
The Wabi Iron Works

**Tanks—Steel:**

Canadian Fairbanks-Morse Co., Ltd.  
Canadian Ingersoll-Rand Co., Ltd.  
Canadian Chicago Bridge & Iron Works  
Marsh Engineering Works  
Osborn, Sam'l (Canada) Limited.  
MacKinnon Steel Co.  
Fraser & Chalmers of Canada, Ltd.  
The Electric Steel & Metals Co.  
Hendrick Mfg. Co.  
The Wabi Iron Works

**Tanks—Oil Storage:**

Canadian Chicago Bridge & Iron Works  
The Mine & Smelter Supply Co.

**Tanks (water) and Steel Towers:**

Canadian Fairbanks-Morse Co., Ltd.  
Canadian Chicago Bridge & Iron Works  
Gould, Shapley & Muir Co., Ltd.  
MacKinnon Steel Co.  
Mine & Smelter Supply Co.  
The Wabi Iron Works

**Tires—Auto, Truck and Bicycle:**

Gutta Percha & Rubber, Ltd.



**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 Apparatus:**

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.

**Trucks—Hand:**

Canadian Fairbanks-Morse Co., Ltd.

**Trucks:**

Canadian Fairbanks-Morse Co., Ltd.

**Tubs:**

Hadfields, Limited

**Tube Mills:**

The Electric Steel & Metals Co.  
 Fraser & Chalmers of Canada, Ltd.  
 Hardinge Conical Mill Co.

**Tube Mill Balls:**

Canada Foundries & Forgings, Ltd.  
 Fraser & Chalmers of Canada, Ltd.  
 Hull Iron & Steel Foundries, Ltd.  
 Peacock Brothers Limited.

**Tube Mill Liners:**

Burnett & Crampton  
 Fraser & Chalmers of Canada, Ltd.  
 Hull Iron & Steel Foundries, Ltd.  
 Peacock Brothers Limited.

**Turbines—Water Wheel:**

MacGovern & Co.

**Turbines—Steam:**

Fraser & Chalmers of Canada, Ltd.  
 MacGovern & Co.

**Twincones:**

Canada Foundries & Forgings, Ltd.

**Uranium:**

Everitt & 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.  
 Imperial Brass Mfg. Co.

**Wheels and Axles:**

Canadian Steel Foundries, Ltd.  
 Hadfields, Limited  
 The Electric Steel & Metals Co.  
 The Wabi Iron Works

**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.  
 The Electric Steel & Metals Co.  
 Mussels, Limited  
 R. T. Gilman & Co.  
 The Wabi Iron Works

**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.  
 Canada Wire & Cable Co.  
 Dominion Wire Rope Co., Ltd.

**Wire Rope Fittings:**

Canada Wire and Iron Goods Company.  
 Canada Wire & Cable Co.

**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.

**Zinc:**

Everitt & Co.

**Zinc:**

The Canada Metal Co., Ltd.  
 Consolidated Mining & Smelting Co.

**Zinc Spelter:**

Canada Metal Co., Ltd.  
 Hoyt Metal Co., Ltd.

**Dominion Engineering & Inspection Company**

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Blackwell, G. G. Sons & Co., Ltd. . . . .	12	<b>G</b>		Mussens, Ltd. . . . .	
Berger, C. L. & Sons . . . . .	12	Gartshore, John J. . . . .	12	<b>N</b>	
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Canadian Pacific Railway . . . . .	5	Hassan, A. A. . . . .	10	Rogers, John C. . . . .	11
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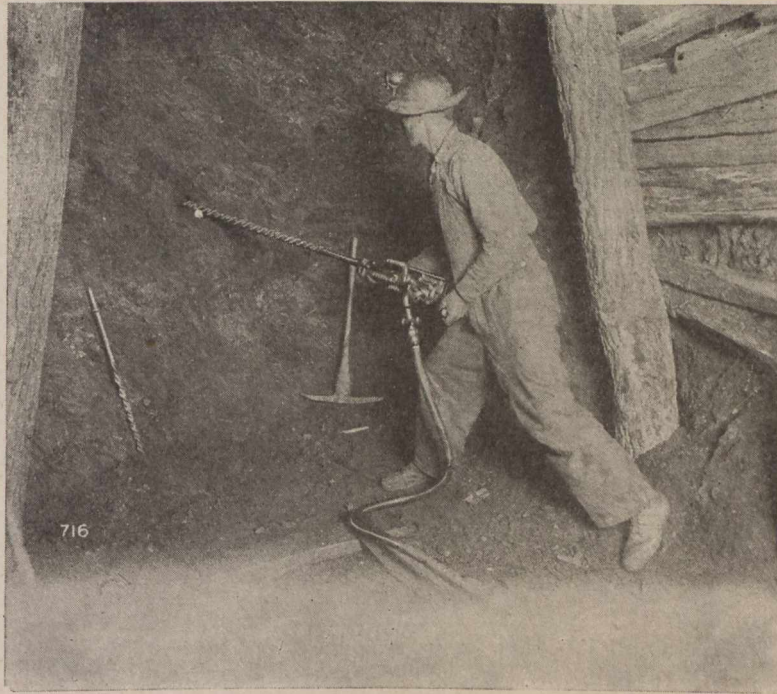
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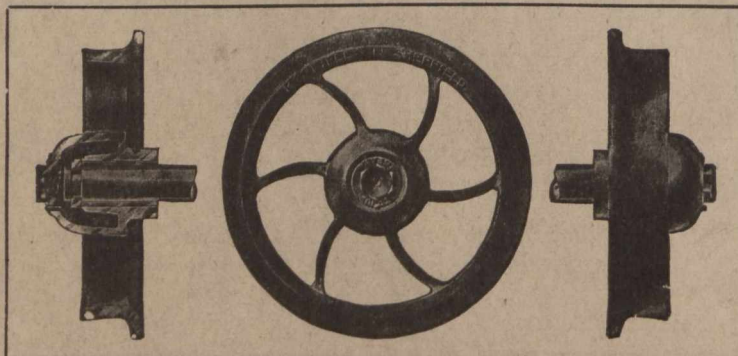
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