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VOL. XXXVIII TORONTO No. 3

CANADA
DEPARTMENT OF MINES

HON. P. E. BLONDIN, Minister. **R. G. McCONNELL, Deputy Minister.**

MINES BRANCH

Recent Publications

The Nickel Industry: with special reference to the Sudbury region, Ont. Report on, by Professor A. P. Coleman, Ph.D.

The Copper Smelting Industry of Canada. Report on, by A. W. G. Wilson, Ph.D.

Building and Ornamental Stones of Canada (Quebec). Vol. III. Report on, by W. A. Parks, Ph.D.

The Bituminous Sands of Northern Alberta. Report on, by S. C. Ells, M.E.

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 Report of the Mineral Production of Canada During the Calendar Year 1914 by John McLeish, B.A.

The Petroleum and Natural Gas Resources of Canada: Vols. I. and II., by F. G. Clapp, M.A., and others.

The Salt Industry of Canada. Report on, by L. H. Cole, B.Sc.

Electro-plating with Cobalt. Report on, by H. T. Kalmus, Ph.D.

Electro-thermic Smelting of Iron Ores in Sweden. Report on, by A. Stansfield, D.Sc.

Non-metallic Minerals Used in Canadian Manufacturing Industries. Report on, by H. Frechette, M.Sc.

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

Memoir 57. Corundum, its Occurrence, Distribution, Exploitation and Uses, by A. E. Barlow.

Memoir 64. Preliminary Report on the Clay and Shale Deposits of the Province of Quebec, by J. Keele.

Memoir 69. Coal Fields of British Columbia, by D. B. Dowling.

Memoir 74. A List of Canadian Mineral Occurrences, by Robert A. A. Johnston.

Memoir 76. Geology of the Cranbrook Map-area, British Columbia, by S. J. Schofield.

Memoir 77. Geology and Ore Deposits of Rossland, British Columbia, by C. W. Drysdale.

Memoir 81. The Oil and Gas Fields of Ontario and Quebe, by W. Malcolm.

Memoir 82. Rainy River District of Ontario. Surficial Geology and Soils, by W. A. Johnston.

Memoir 84. An Exploration of the Tazin and Taltson Rivers, Northwest Territory, by Charles Camsell.

Memoir 85. Road Material Surveys in 1914, by L. Reinecke.

Memoir 87. Geology of a Portion of the Flathead Coal Area, British Columbia, by J. D. Mackenzie.

Memoir 88. Geology of Graham Island, British Columbia, by J. D. Mackenzie.

Memoir 89. Wood Mountain-Willowbunch Coal Area, Saskatchewan, by Bruce Rose.
Ontario. Topography.

Map 59A. Wheaton, Yukon Territory.

Map 66A. Brechin Sheet, Ontario and Victoria Counties,

Map 150A. Ponhook Lake Sheet, Nova Scotia.

Map 153A. Asquith and Churchill Townships, Sudbury District, Ontario.

Map 158A. Nanaimo Sheet, Vancouver Island, British Columbia.

Map 175A. Ymir, Kootenay, British Columbia.

Map 181A. Wood Mountain-Willowbunch Coal Areas, Saskatchewan.

Applicants for publications not listed above should mention the precise area concerning which information is desired.

Maps published within recent years may be had, printed on linen, at the nominal cost of ten cents each.

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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CIRCULATION

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CONTENTS

Editorials—	Page
Waste through Duplication	49
A Misleading Prospectus	50
Correspondence	50
Mining in Quebec in 1916. By T. C. Denis	51
National Resources Survey	52
Nitrates from the Air. By W. L. Goodwin	53
Pig Iron and Steel in 1916	54
A New Electric Steel Plant	58
Dominion Steel Corporation in 1916	60
Book Reviews	62
Dividends in 1916	63
Personal and General	67
Special Correspondence	68
Markets	72

WASTE THROUGH DUPLICATION

It is strange that at this time when there is such serious need of economy and more intelligent development of our resources that more attention is not given to the reorganizing of the Departments at Ottawa. Instead we have the spectacle of increase in organizations for duplicating work.

It has been recognized clearly that we are suffering from lack of knowledge of our resources and methods of utilizing them. There is a demand for a more systematic inventory of our men and our industries. These things the Government seems to appreciate.

There seems as yet however to be lack of appreciation of the fact that existing departments are qualified to do the necessary work if given capable direction. The various departments are being allowed to go along in the old ruts accumulating facts without assimilating them. Worse still, several departments are collecting the same data. The amount of overlapping in government departments is bad enough at any time. With the demands now being made upon the country it is criminal to allow it to continue.

Unfortunately conditions seem to be growing worse instead of better. Instead of developing the departments which could do the necessary work systematically and economically, our Ministers seem to think the proper thing to do is to follow popular fancies in fashion in various countries and organize new departments to conduct special work. Thus following President Roosevelt we had established in Canada a Commission of Conservation which spends much of its efforts in duplicating work done in other departments and publishing such ridiculous accounts as that claiming the discovery of phosphate deposits in the Rockies, when as a matter of fact what had been done was the re-discovery of deposits known to be of no economic value.

More recently we have had thrust upon us an advisory council on Industrial and Scientific Research headed by a professor of Physiology who is an eminent authority on the composition of cellular and tissue fluids in the animal body; the inorganic composition of secretions and excretions; and the physical and chemical factors in heredity. This advisory council is starting its work by sending out a sheaf of enquiries which indicate that it does not know or care what the existing government departments are doing or have done.

It is not only these special commissions that duplicate the work. The several departments of government are regularly doing work which they have no business to be doing. Some not content with their own collections of data, copy and republish data collected and published by other departments. A glaring ex-

ample of this is the rehash of the reports of the Customs Branch published by the Department of Trade and Commerce, so that, for instance, the absurd valuation of nickel matte in the Customs reports is repeated in the reports issued on the value of our exports. The data are apparently not understood by those responsible for their republication and consequently are not put in such form as to be of much use to the reader.

No one political party can be blamed for the present condition of affairs. The public appoints as its representatives many men who are unfit for the job, and Ministers are chosen as heads of Departments without regard to their abilities. Thus we have the direction of important departments placed in the hands of men who have shown no ability in the organizing and direction of their staffs. Many Ministers seem to think their chief work is the adjustment of patronage matters in their respective constituencies.

Compared with other industries mining has at its service at Ottawa an unusually efficient staff of technical men. The organization of the Mines Branch at Ottawa is such that real assistance is given to the industry in spite of weakness at the top. The nucleus of a strong department exists and it is a pity that the work of the Branch is held back by lack of a leader. Why cannot we have as Minister of Mines a man who knows something about mining? Why are other departments of the government permitted to attempt to duplicate the work of the Mines Branch and to detract from the efficiency of both? Why do we have an Advisory Council composed of men unqualified to give advice on the application of science to industry, and unfamiliar with the work of the various departments?

A MISLEADING PROSPECTUS.

The mails are being loaded these days with the literature of brokers offering for sale stock in new mining companies. Mining engineers would do well to acquaint themselves with what is going on. They should do what they can to prevent the misrepresentation which is becoming more and more common.

There has recently come to our attention the case of a company organized to develop a copper property in Ontario. The New York broker who offers the stock for sale makes statements regarding the property which are quite unwarranted by the facts and links with the enterprise the name of a Toronto mining engineer, Mr. Robert Bryce.

The prospect is described as sufficiently developed to mine and ship ore which will produce immediate profits to the company, and it is stated that in a few months the company should be earning at the rate of $1,000,000 per year. Mr. Bryce's report does not contain any such information.

We are pleased to learn that Mr. Bryce as soon as he saw what the brokers were doing, resigned as consulting engineer of the company and endeavored to prevent the further dissemination of the misleading literature.

SILVER AT 1600 FEET

One of the most important discoveries yet made at Cobalt is reported from the Beaver mine. A vein 4 in. to 6 in. wide, rich in silver, has been encountered at the 1,600-ft. level. The vein has been found by sinking through a thick diabase sill and then exploring the underlying Keewatin rocks. The find is confirmed just as we go to press. Further particulars will be given in our next issue.

It is with great regret that the mining men of Canada learned of the death on Saturday, January 20th, of Col. A. M. Hay. The Colonel was universally well liked and will be greatly missed by those who had the pleasure of knowing him. He was the life of many a gathering and will always be remembered with kind thoughts. Members of the Canadian Mining Institute had come to regard the Colonel as one of their most valuable possessions, for he helped to make enjoyable all our meetings. No one held the welfare of the Institute more closely to his heart.

Mr. Wilson says he is longing for world peace. The Allies are fighting for it.

THE BALLOT FOR SIMPLER SPELLING.

(In the riter's Amended Speling.)

Editor Canadian Mining Journal,—

Sir, About twelv years ago the elder Stead put out articl after articl in his "Review" with heding: Wake up, John Bull! ! urging that Britishers wer sliping behind in their competitv race with other nasions. The War's course has now burned this into our souls. Need ov increast efisiency is manifest in a thousand-and one ways.

This leads me tu express a hope that at the pending Annual Election among American mining engineers the balot for Simpler Speling shud be not overlookt, but markt overwelmingly in its favor. A peple that wastes its eforts and energy on silent and useless letters; but contributes tu their own defeat by such waste that employd tu efect, wud turn many a scale in their favor, spells Sieve with five letters, when three are enuf, and has the ever-puzling i.e. (or is it e.i.?), tu say nothing ov its analogy tu sift. This exampl cud be multiplied a thousand fold. We shud get at the core of this by the most direct route.

The list proposed (about thirty short end forms, haf of them in frequent use already) makes a good beginning,—often haf the batl.

Respectfully,

Toronto, 22nd Jan. A. HAMILTON.

MINING IN THE PROVINCE OF QUEBEC IN 1916

By T. C. Denis, Superintendent of Mines.

The first effect of the war on the mining industry of the Province of Quebec, was a marked depression. The production of asbestos figures for a large proportion in the table of the products of the mines of this province, and during the first year of the war the market for asbestos was demoralized. But after the all-absorbing necessities of the moment had been met, came a wave of intense organization and production, in view of the future needs of the war. Then the mining industry came into its own, and since the autumn of 1915 the demand for asbestos has been very keen, the prices have been higher than they ever were before, and the output has only been limited by the great shortage of labor which has prevailed during practically the whole of 1916. The asbestos mines of Thetford, Black Lake and Danville under the present conditions, could give steady employment to six hundred more men than they have now. As to prices, more especially for better qualities, they are very satisfactory. Crude No. 1 and No. 2 have more than doubled in price, and for some special grades of No. 1, which two years ago might have brought $400 a ton, as much as $1,200, and even more has been quoted. A very important use of the substance, which has developed during the last eighteen months, is the introduction of the asbestos fabrics in the manufacture of automobile tire covers, to replace the heavy duck used heretofore. It is said that the vegetable fibre of the duck is somewhat affected by contact with the hot liquid rubber in the process of manufacturing these tires, and that the fabric deteriorates easily, whereas the mineral fibre of asbestos remains quite unaffected, and the life of the tires is thereby doubled.

Similar remarks as to the cause of renewal of activity in mining apply to chromite and magnesite, two products for the supply of which the United States relied greatly on foreign sources. The chromite production of the Coleraine—Black Lake district—will be, by far, the highest on record during the year 1916, and as to magnesite from the Argenteuil fields, it is sufficient to mention that in 1915 the production totaled 16,000 tons, while in 1916 shipments at the rate of 150 tons and more a day were made during the greater part of the year. The shipping of magnesite has been greatly hampered by the bad state of the roads. The magnesite mines, or quarries, in Argenteuil county, are from 8 to 12 miles distant from the railway and haulage is very expensive. The Scottish-Canadian Magnesite Co., one of the important producers, has just completed a railway spur, twelve miles long, connecting the mine with the station of Grenville on the C. P. R., and this company will, in the future, be independent of the state of the roads for shipping their product.

Great activity has prevailed in the mining of chromite. The prices offered are from three to four times those prevailing before the war, and this has led to a feverish reopening of the chromite mines and occurrence of the Coleraine region. Whereas in 1914, chromite was quoted in New York at $14 a ton for 50 per cent. ore, this is now $45. The Mutual Chemical Co. has two mills running on the concentration of chromite, one of which is a custom mill at Black Lake and the other at Little Lake St. Francis. From all appearances the production of cupriferous pyrite of the Eastern Townships will be from one-quarter to one-third higher in tonnage than in 1915. Both the Eustis Mining Co. and the Weedon Mining Co. have been very active throughout the year.

The largest producing molybdenite mine in Canada, and probably in North America, is being earnestly worked in Onslow township, about 30 miles from Ottawa. In this occurrence molybdenite is associated with a very coarse-grained rock, containing hornblende, pyroxene, plagioclase and quartz, with pyrrhotite and pyrite. This rock appears to penetrate a flesh-red fine-grained granite. The mine is being worked by the Canadian-Woods Molybdenite Co., and the ore is being shipped at the rate of 200 to 300 tons a week, with a molybdenite content of 2 to 5 per cent. Some specially selected carloads have gone even higher. The ore is sent from the mine to concentrating mills in Ottawa, in Renfrew and in Denver, Colorado. A large mill, to handle 120 tons of rock a day, is under construction at the mine, and is expected to be running very shortly. The process installed in this mill is the Woodwater flotation process, which, the operators state, is the one which has given the most satisfactory results in the concentration of molybdenite. The price of Canadian molybdenite has been set by the British Government at 105 shillings a unit delivered in England; this is equivalent to about $1.10 a pound of pure molybdenite. In the United States, molybdenite is also much in demand, and at higher prices, as much as $1.75 a lb. being quoted in the metal trade papers.

Among other mineral products of the Province of Quebec, which were much stimulated by the war, may be mentioned zinc, lead and china clay.

On the whole, the war has proved a stimulant to the mining industry of the Province of Quebec, and it is expected that the quantities and the values of the products of the mines, exclusive of the building materials, will show a marked increase in 1916 as compared with 1915. This increase, however, will somewhat be counterbalanced by a probable decrease in structural materials, such as building stone, brick and other clay products, on the production of which the economic conditions now prevailing throughout the world have had a depressing effect.

A WONDERFUL NICKEL DEPOSIT.

One of our readers sends us the following letter which he received recently from a correspondent in Sudbury:

Dear Sir,—

Regarding our conversation in the Balmoral Hotel about my Nickel claim I hereby enclose you a Report by one of the most Reliable mining men in this North Country. And who discovered the first nickel in this Country. I would to hear from you as I am anxious to have a sale made as soon as Possible as the goods are their sure. Hoping to hear from you soon.

Yours truly.

P. S.—I was trying to get a map to send you But could not get one.

The report accompanying the correspondent's letter follows:

Sir,—I have examined your mining claim witch found a very good stain cross the lot and two little pits to the Dept of about four feet witch showed peretied and gossen in different places which the property looks very good to me and promessing of a good Body of Nickel ore.

NATIONAL RESOURCES SURVEY.

Arthur D. Little, Ltd., Chemists, Boston, Mass., now doing some work in Canada for the Canadian Pacific Railway, have issued the following statement concerning their plans.

The first step in any plan for the broad development of the Natural Resources of the Dominion necessarily involves the collection of definite and accurate information regarding the resources themselves and the systematic classification of this information in such form that it shall be readily available to those who may be expected to utilize it to advantage.

With full appreciation of the splendid work of many governmental, corporate and private agencies it may fairly be said that the resources of Canada have as yet scarcely been touched. Many recognized sources of national wealth and individual prosperity are still practically ignored. Undoubtedly many others, now wholly unknown, await discovery and exploration.

It is nevertheless true that a vast amount of information of the highest practical value has been accumulated by the Government Departments, notably, for example, by the Department of Mines and the Water Powers Branch, Department of the Interior, the Railways, the Canadian Mining Institute, Society of Chemical Industry, and other scientific bodies, trade organizations, industrial corporations and other individual explorers, engineers and prospectors. A continuous and increasing stream of data may confidently be expected to flow from these sources. The immediate need is, therefore, not for new agencies for obtaining new facts, but for an effective organization which shall collate and classify the data already in hand or directly forthcoming. It is the hope and purpose of its sponsors to supply such an organization in the Natural Resources Survey.

It is the initial object of the Survey to recast into quickly available form the immense mass of valuable information regarding Canadian resources now stagnant in Government publications, scientific and technical journals, corporation records and the special reports of individuals. It is therefore proposed to abstract this data and transfer the salient and important facts regarding agriculture, mines, minerals, waterpowers, forests, fisheries and furs to standardized forms capable of close classification and to so control and key the information that related groups of facts may be promptly furnished as required. Concurrently therewith and supplementary thereto a census will be made of Canadian scientific and technical men with particular reference to their specialized lines of study and performance; the special libraries and research facilities of the country will be catalogued and classified lists made of the corporations and individuals most directly interested in specific natural resources, and presumably able to utilize them to advantage.

This plan, so comprehensive in scope and involving such widespread benefits to the Dominion, was originated by Lord Shaughnessy. Its development was in May, 1916, entrusted by His Lordship to Arthur D. Little, Limited, a Canadian Corporation operating under Dominion charter, and including in its organization chemists and engineers of many years experience in the industrial applications of science in many parts of the world. In their consideration of the broader questions of policy and development the Directors will be guided by the Survey Advisory Board composed of eminent specialists and organizers.

Although initiated by the Executive of the Canadian Pacific Railway and supported by that Company the work of the Survey will be conducted in the interest of no individual or corporation, but impartially for the benefit of all and with the sole purpose of advancing the industrial development and prosperity of the Dominion.

Obviously a work of this magnitude cannot attain its full measure of usefulness without the cordial support and concurrent effort of all the agencies, organizations and individuals having at heart the welfare of the nation and in position to cooperate with the Survey. The Directors have already been assured of the support of scientific organizations and business associations and they confidently appeal to corporations and individuals throughout the Dominion for cooperation. The mass of detail to be considered is so great that the Survey must in large part rely upon the voluntary assistance of occasional and part time collaborators and the Directors therefore particularly desire to be brought into touch with scientific and technical specialists who are prepared to furnish information regarding specific resources or willing to abstract reports and publications dealing with such resources.

The Survey intends to issue from time to time Bulletins devoted to particular resources or immediate industrial opportunities and to place as occasion arises special reports before corporations and individuals in Canada, Great Britain and the United States, who may be expected to base industrial development thereon.

The plan of the Survey further provides for the prosecution of industrial research on lines selected for their promise of yielding results of broad general benefit or of immediate advantage to individual communities or industries.

The Survey is, obviously, a natural complement and correlative of the larger plans, to which the Federal and Imperial Governments are committed, for mobilizing the resources of the Dominion and the Empire.

Correspondence regarding the work of the Natural Resources Survey and tenders of cooperation should be addressed to the Directors, Arthur D. Little, Limited, 137 McGill Street, Montreal.

THE PENSION BOARD.

The Dominion Government have appointed a Board of Pension Commissioners for Canada with offices in Ottawa. As this Board wish to cause as little delay as possible in dealing with communications with regard to pensions, they wish the public to correspond directly with the Board of Pension Commissioners, Ottawa.

A great deal of delay may be caused by communications being sent through other Departments of the Government.

The Patriotic Fund Association and the Military Hospitals Commission have kindly consented to give information and assistance to those wishing to write direct to the Board of Pension Commissioners. These societies have offices in certain localities throughout Canada.

In addition, in order to facilitate the granting of pensions, the Board is opening Branch pension offices in Vancouver, Calgary, Edmonton, Regina, Winnipeg, London, Hamilton, Toronto, Barrie, Kingston, Ottawa, Montreal, Quebec, St. John and Halifax. All information with regard to pensions may be obtained from these offices.

NITRATES FROM THE AIR*

By W. L. Goodwin.

It was in Norway, with its fine waterpowers for generating cheap electricity, that (in 1905) nitric acid was first profitably made from air. This result was due to Birkeland and Eyde, whose process was soon adopted extensively in other countries. The success of the process depends on heating the air to the high temperature of the electric arc, about 3,000 degrees C., and then cooling it as quickly as possible. It is interesting to note that a Queen's graduate, G. W. Morden, made an important improvement in the apparatus, using short electric arcs with water-cooled anodes. Birkeland and Eyde's improvement was to generate the electric arc in a strong magnetic field. This caused it to spread out as a large disc, which increased the active area very much. In 1912 the factory at Notodden, Norway, was treating about 700,000 litres of air a minute, giving about 45 lbs. of nitric acid, which, converted into nitrate of lime, amounts to about 20,000 tons of that substance per annum. In 1905, the first apparatus was installed to use 160 H.P. In 1915 the business had expanded to the extent of using 250,000 H.P. in Norway alone. The acid is converted into nitrate of lime for fertilizer, into ammonium nitrate for the manufacture of explosives, and into several other compounds for the chemical industries. For several years English manufacturers of explosives sent ammonia solution to Norway to be returned as ammonium nitrate. But this situation has been apparently redeemed by E. K. Scott, whose improvements if proved successful may bring much of this important chemical waste to England. He uses the waste heat of the arc to generate steam, which thus provides part of the power for producing the arc. Another gain is in using instead of air a mixture of oxygen and nitrogen in equal parts by volume, easily made by a liquid air machine. Scott's third improvement is in using an arc at 4,200 degrees instead of the usual practice of 3,200 degrees.

By this process the first product, formed in the electric arc, is an oxide of nitrogen which on mixing with more oxygen and water combines with them to form nitric acid. Thus the only raw materials required are air and water, practically inexhaustible.

But we are not dependent on the direct oxidation of atmospheric nitrogen. In 1892 a Canadian, T. L. Willson, made possible the commercial manufacture of calcium carbide, which up to that time had been a rather expensive chemical curiosity. In 1895-97 Frank and Caro elaborated a process for combining this with nitrogen to form a substance, calcium cyanamide, which yields ammonia when acted on by water. Now ammonia is almost as good as nitrate for fertilizing purposes, and when nitrate is required it can be made by the oxidation of ammonia. In 1912 the manufacture of this new fertilizer, called commercially nitrolime, had increased to 165,000 tons a year, in Norway, Germany, Austria, Italy, France, Switzerland, the United States, Central Provinces of India, and Japan, but none in Great Britain. But the largest factory has been built by British capital in Norway at Odda near the beautiful Hardanger Fjord, where a very large waterpower is available. At that time 20,000 H.P. was in use and 80,000 H.P. ready. The nitrogen is extracted from the air by liquefying the air with a Linde machine, from which the nitrogen, boiling at a lower temperature than oxygen, can be delivered fairly pure. If nitrolime is used to make ammonia to be oxidized to nitric acid, an analysis of the whole process shows that the elements of this nitric acid come from air and water, just as in the case of the first process described. The Linde machine can be so designed as to deliver nitrogen and oxygen separately, both fairly pure, and it is thus possible to provide at one operation the nitrogen for the manufacture of nitrolime, and the oxygen to convert the ammonia into nitric acid. However, the nitrolime is usually applied directly to the soil, where it is slowly acted on by the water and thus supplies ammonia to the plants. It is believed that it is in part directly assimilated. The physiologist will be interested in noting that when nitrolime slowly decomposes in the soil it forms urea and later ammonium carbonate. In 1914, in a review of the state of the cyanamid (nitrolime) industry in the United States, the statement is made that the cost of food products has increased twice as fast as the general cost of living, and it was pointed out that in that country cyanamide is the cheapest form of nitrogen fertilizer. The electric arc process for nitric acid and nitrate can not, it is contended, compete with it, owing to the high cost of electricity.

But chemists have found a third way of "fixing" the nitrogen of the atmosphere so as to make it ready for plant food. In 1881 an English chemist named Johnson stated that nitrogen and hydrogen combined slightly when in the presence of hot spongy platinum, a small proportion of ammonia being formed. This was disputed at the time by two other English chemists, who promptly proved Johnson to have made a mistake. But time has shown that he had made no mistake, and the elaboration of a commercial process for making ammonia by the direct combination of hydrogen and nitrogen is a brilliant triumph, due to the German chemist Haber. The thing looked hopeless at first sight. The combination ceased as soon as about one-tenth of one per cent. of the gases had combined. But Haber, working at very high pressure and using crude uranium instead of platinum to assist combination, succeeded in bringing the yield up to over 10 per cent., which made the process a practicable one. The hydrogen is made by the decomposition of water, so that the sources of the raw materials are as before, water and air. The economical oxidation of ammonia to nitric acid seems to have been lately worked out by Ostwald in Germany, and it is claimed that in that country the three processes for making nitrogen compounds out of atmospheric nitrogen are all at work, making Germany independent of the South American nitrate beds.

So far, the subject has been discussed from the point of view of nitrogen fertilizers; but this by no means covers the ground. Large quantities of nitric acid, nitrates, and ammonia are used in the manufacture of explosives, for use in war and the peacefud occupations of mining, railway building, etc. Another class of nitrogen compounds, the cyanides, are required for the extraction of gold and silver from their ores. Large quantities of ammonia are used in refrigerating plants, the use of which is extending very fast. Outside of these larger requirements the chemical industries absorb very considerable quantities of nitrogen compounds.

* Extracts from an Article Published in "Queen's Quarterly."

The whole subject is just now under review in the United States. The editor of The Journal of Industrial and Engineering Chemistry estimates the U.S. supply of nitrogen compounds for 1916 as follows:

	Tons of N.
Sulphate of ammonia (produced from coal)	53,600
Sulphate of ammonia, imported	4,500
Nitrate of soda, imported	187,200
Cyanamid, imported	11,500
	256,800

These materials are for the following purposes:

	Tons of N.
Sulphate of ammonia, for chemical industries	21,700
Sulphate of ammonia, for refrigerating	12,600
Sulphate of ammonia, for agriculture	23,800
Nitrate of soda, for chemical industries	155,600
Nitrate of soda, for agriculture	31,600
Cyanamid for agriculture, etc.	11,500
	256,800

It is to be noted that the industries other than agricultural absorb about three-quarters of the total, and that only about one-fifth of the whole of this combined nitrogen is home production. Lawrence Addicks, commenting on this state of affairs, writes in the November number of the same journal: "It has been long evident, and for a little while generally appreciated, that were we to have a war with a first class power about half of our navy would be engaged in protecting our line of communication with Chile, instead of protecting our coast; and, as nitric acid is indispensable in the manufacture of explosives this has given the government a special interest in the development of a process requiring no imported supplies." This statement would apply to any country with a large seaboard, and no factories for the production of nitrogen compounds from air. The U. S. Government has lately voted $10,000,000 to establish a national nitric acid works. The chairman of the committee appointed to carry out the project has written to a member of our Chemistry staff (Major L. F. Goodwin) asking his advice.

The success of the artificial nitrate and the cyanamid industries depends on cheap waterpower to generate the electric current required. Haber's ammonia process is independent of this, but for the manufacture of nitric acid at least it could hardly compete with the other two under normal commercial conditions. I suppose that there are few countries in the world where waterpower is available in such large quantities as in Canada. And as the atmosphere is common property, there is no reason why Canada should not become one of the largest, if not the largest, producer of these important substances. She has already taken the lead in the manufacture of carbide, the starting point for the manufacture of cyanamid. Considering the vast national importance of these nitrogen compounds in peace and war, it would seem as if they should be the first to engage the attention of the lately appointed committee on Industrial Research.

At present the demand for nitric acid for the manufacture of explosives is enormous, and it is a difficult economic problem to provide for war conditions. If private capital is invested in the necessary plant it will be idle in times of peace, as the war requirements are far in excess of any probable demand in times of peace. It is this consideration which has prompted the U. S. government to make the manufacture of nitric acid from air a government enterprise. It may be that this will lead to a more general use of such materials in intensive farming. A government works could continue to manufacture in peace times and so keep the price of nitrate down. This would encourage farmers to use it. But, of course, such a condition could not be permanent. Ultimately the government works would have to be in the same position as any other preparation for war. It would have to remain idle in times of peace.

A writer in a recent number of The Journal of the Society of Chemical Industry states that it is feared in Germany that at the end of the war foreign competition in all those industries which depend on these substances will be overpowering. The Chilian nitrate deposits are in the hands of an English-French syndicate. The Northwestern Cyanamid Co. controls 1,000,000 H.P. of waterpower in Scandinavia. English interests have secured control of great waterpowers in the United States and Canada. All this at least emphasizes the importance of taking such measures in this country as shall secure for Canada the control of this very important industry. In too many cases we have allowed vast Canadian resources such as our nickel deposits and our pulpwood forests to pass largely into foreign hands. This should be prevented by a combination of wise legislation, public spirit, and scientific enterprise.

PIG IRON AND STEEL IN 1916.

The Dominion Department of Mines has received from the producers a record of the production of pig iron and of steel ingots and castings during the first eleven months of the year which together with the estimates for December show a probable production of pig iron in Canada during the twelve months ending December 31, 1916, of 1,171,727 short tons (1,046,185 gross tons), and a probable production of steel ingots and direct steel castings of 1,454,124 short tons (1,298,325 gross tons), of which 1,423,485 short tons were steel ingots and 30,639 short tons were direct castings.

The production of pig iron in 1915 was 913,775 short tons and of steel ingots and castings 1,020,896 short tons, showing an increase in the production of pig iron in 1916 of about 28 per cent. and an increase in production of steel ingots and castings of over 42 per cent.

The 1916 production was greater than that of any previous year, the second largest production of pig iron having been 1,128,967 short tons in 1913 and of steel ingots and castings 1,168,993 short tons also in 1913.

The production in 1916 during the first six months and monthly during the last six months was as follows in gross tons:

	Pig Iron Gr. tons.	Steel Ingots Gr. tons.	Direct Castings Gr. tons.	Total Gr. tons.
6 months ending—				
June	501,872	577,999	11,715	589,714
July	82,154	101,178	2,284	103,462
August	78,450	108,889	2,299	111,188
September	91,736	116,828	2,524	119,352
October	101,436	126,577	2,924	129,601
Nov. (partly estimated)	95,237	119,468	2,745	122,212
Dec. (est.)	95,300	119,930	2,865	122,795
6 months ending December	544,313	692,970	15,641	708,611
12 months ending Dec.	1,046,313	1,270,969	27,356	1,298,325

COAL IN 1916.

The Dominion Department of Mines has received from the principal coal operators in Canada, returns of their production for ten months supplemented in most cases with estimates for November and December.

On the basis of the record available, it is estimated that the total production of coal in Canada during the calendar year 1915 will approximate 14,365,000 short tons (equivalent to 12,825,892 gross tons). The estimate is believed to be fairly close for Nova Scotia and British Columbia. In Alberta, however, there are so many small operators that final returns may show a wider variation from the estimates now made.

By provinces, the estimate is as follows, the figures for 1915 being included for comparison.

Estimated Coal Production in Canada, 1916—in Short Tons.

	Production of Coal 1915.	1916.	Increase or Decrease
Nova Scotia	7,463,370	6,950 000	513,370
New Brunswick ...	127,391	135 000	7,609
Saskatchewan.	240 107	260,000	19,893
Alberta.	3,360,818	4,400 000	1,039,182
British Columbia ..	2,065,613	2,620,000	554,387
Yukon.	9,724	.....	.....
Total.	13,267,023	14,365,000	1,097,977

The 1916 production exceeded that of the two previous years the increase over 1915 being about 8 per cent. Nova Scotia is apparently the only province that has not made an increased production, the falling off in this province being a little less than 8 per cent. The increase in Alberta is nearly 32 per cent. and in British Columbia nearly 27 per cent. The production in New Brunswick, Saskatchewan and British Columbia is the highest on record. No estimates are available yet as to the Yukon output.

VIPOND—NORTH THOMPSON MERGER.

There have been many rumors regarding the basis on which the Vipond and North Thompson companies will be merged. The "Northern Miner" has received information from a reliable source and the basis as set forth in the following paragraphs, is believed to be substantially correct. It will be seen that the North Thompson company will have control over the new company.

The new company is to be capitalized at $3 000 000. Vipond and North Thompson each receive 1 125 000 leaving 750 000 shares in the treasury. Of this 750,000 shares North Thompson people take 300,000 shares at 60 cents per share, this stock in turn being taken from them by a syndicate at the same price. This leaves 450,000 shares in the treasury of the new company. Of the 1,125 000 shares received by the Vipond, 225 000 shares are given to Mr. Ward in exchange for his bonds on the basis of 40 cents per share. This puts Vipond into the combination free and clear of all debts. Of the 225 000 shares received by Mr. Ward 75 000 shares are taken at 40 cents by the same syndicate that takes the 300,000 shares from North Thompson. This leaves Vipond with 900,000 shares to be exchanged for the present Vipond stock at the rate of share for share.

All the ore being treated in the Vipond mill at present is coming from the North Thompson property. This should make a substantial increase in average mill heads at once. Connections with the Vipond are to be made on the 600 foot level and a crosscut is now being driven at that depth.—Northern Miner.

ANNUAL MEETING, A. I. M. E.

New York, Jan. 22.—The programme of the 114th meeting of the American Institute of Mining Engineers, which convenes here February 19th, was made public to-day. Sessions will include the annual business meeting and presentation of papers on subjects of the greatest scientific interest in the mining field. In addition, a number of special social features are being planned, including an all-day excursion by special train to West Point, where the engineers will view a number of exhibitions and inspect the grounds of the military academy.

According to registrations received, this year's prosperity of the mining camps in the Middle and Far West will be reflected in the attendance at the February meeting. Individuals connected with practically all of these will take some part in the technical sessions.

The meeting will extend over four days and will open on February 19th, with sessions on geology, metallography, petroleum and gas, and milling and smelting. On the following day, sessions will be held on iron blast furnace practice on flotation. The principal sessions of the third day will be held on the manufacture of iron and steel.

Among the leading papers which will be presented are: (1) Recent Geological developments on the Mesabi Iron Range, Minn., by J. F. Wolff: (2) Grain Growth Phenomena in Metals, by Henry M. Howe and Zay Jeffries; (3) Evidence of the Oklahoma Oil Fields on the Anticlinal Theory, by Dorsey Hager; (4) Magnetic Concentration of Low Grade Magnetic Iron Ore by S. Norton; (5) The Conservation of Phosphate Rock in the United States, by W. C. Phalen; (6) Potash as a by-product from the Blast Furnace, by R. J. Wysor; (7) Significance of Manganese in American Steel Metallurgy, by F. H. Willcox.

The committee on arrangements for the convention includes: David H. Browne, chairman; Lawrence Addicks, P. E. Barbour, George D. Barron, Karl Eilers, Louis D. Huntoon, H. A. Megraw, Thomas T. Read, Burr A. Robinson, F. T. Rubidge, E. Maltby Shipp, Bradley Stoughton, Edward B. Sturgis and Arthur L. Walker.

COBALT SHIPMENTS.

For the month ending Dec. 31, fifteen northern companies shipped an aggregate of 38 cars of ore, approximating 2,578,426 pounds. Dominion Reduction with six cars, weighing 495,000 pounds, was the leader of the Cobalts, McKinley-Darragh coming second with 330,733 pounds. A summary follows:

Shipper.	Cars.	Pounds.
Dominion Reduction	6	495,000
McKinley-Darragh	4	336,733
Mining Corporation	3	214.498
Beaver Consolidated	2	138,166
Coniagas	2	112,815
Penn-Canadian	2	83.505
Trethewey	2	76,456
La Rose	1	87.390
Buffalo	1	64,934
Hudson Bay	1	61.047
Aladdin Cobalt	1	44,600
Total	25	1,700,144
Other Camps.		
Pittsburg-Lorraine	1	62.642
Miller Lake-O'Brien	1	40.000
Hollinger Con. (gold slag)	1	72,740
Alexo Mining Company (nickel ore) ..	10	694,000

CROWN RESERVE.

"Financial Times" in a recent number published the following article by L. W. L.

The Crown Reserve Mining Company recently gave proof of being still alive by declaring a five per cent. dividend, for 1916, which has since been paid. This dividend came from the profits of the Porcupine Crown —which company the Crown Reserve Company controls —and from the sale of silver in store and disposed of during the year at better prices than could have been obtained if it were sold when produced.

During the year the Crown Reserve Mine just paid its own operating costs. The high price of silver has permitted the mine to produce mill ore and small patches of high grade, to meet the cost of development. About 40 tons of low grade ore per day is at present being treated. As expenses have been reduced to a minimum, the mine is in a position to pay its way, but no large profits are at present to be seen.

The big event of the year, from the viewpoint of the shareholders of the company was the discovery in the development work at the north shaft of the Crown Reserve, where a great deal of work has been done during a protracted period, that there is a large area of conglomerates, which were cut off from the conglomerates which proved so profitable in the original area mined by the Keewatin. As soon as the Keewatin was struck, in the original workings, the values disappeared. This new conglomerate area is now being vigorously prospected, with every chance that something good may be struck, in fact, there is a strong possibility that an entirely new series of ore bodies may be developed. The discovery of this conglomerate area may have an effect on the Silver Leaf property on which the same formation probably occurs. This is all on the North side of the lake, where a shaft was sunk some years ago to the 500 foot level and development work done on a smaltite vein carrying low silver values. Nothing new, however, was discovered during the year in the old Silver Leaf workings.

This property is at present the main asset of the Crown Reserve Company. During the year, the Porcupine Crown developed, on the whole, very satisfactorily. There do not appear to be any ore bodies to the west of the main vein, as the quartz porphyry cuts off the mineralized zone at this point, but the main vein and allied ore bodies have developed very well. The big development in 1916 was the opening up of an ore body between the 800 and 900 ft. level, running $100 to the ton. This will enable the management to "sweeten" their low grade and materially aid production. During the year the output was maintained, and the cash surplus was increased, after the payment of the usual dividends. The life of this property, like all mining propositions, is limited, but the mine, so far as ore reserves are concerned, is in a better position to-day than it was a year ago.

During the year the Crown Reserve property threw up their working option on the Globe Mine, in California. They found that the property was not developing successfully. Various other options were considered and some taken up, but subsequently abandoned. At present the Crown Reserve Company is developing claims in the Boston Creek district which look promising; and they have a working option on the Cochrane mine in Cobalt, which adjoins the Temiskaming, on the north of the latter property. The Crown Reserve officers are opening up the Cochrane at depth, as it is reported that the management are of the opinion that heretofore this property has not been prospected sufficiently at depth.

It is quite clear that the future of the Crown Reserve Company, as a permanent investment, depends on the acquisition of further properties, and there is no doubt that the management are leaving no stone unturned to discover properties of merit. Prospects are few. But the shareholders of the Crown Reserve Mining Co. would never have had the valuable Porcupine Crown property, with ore reserves valued at over $2,000,000.00, if the management had not put into force their policy of examination, acquisition, and development of promising propositions from a legitimate mining view-point.

CROWN RESERVE.

The annual meeting of Crown Reserve Mining Company was held on Jan. 24., in Montreal. The annual report for the year just ended does not make a very satisfactory showing from a mining point of view, and indicates that the life of one of the most productive silver mines in the Cobalt camp is nearing its close. Gross profits from mining amounted to $191,822, while mining and milling costs totalled $188,849, leaving the small net profit of $2,973. The revenue from investments, the chief of which is the Porcupine Crown stock, amounted to $145,413. Costs of administration were $22,487, and dividend disbursements accounted for $88,440. Silver on hand was estimated at 2,498 ounces.

PORCUPINE CROWN.

The annual statement of the Porcupine Crown mine as presented at the annual meeting on Jan. 24, in Montreal shows that operating profits for the year ending Dec. 31, 1916, were $270,430, as against $299,116 in 1915. The balance carried forward from 1915 amounted to $269,977, less $2,536 allowed for readjustments, and interest was shown as $5,070.

Distribution was made as follows: In dividends, $240,000; bonuses to employees, $6,124; war taxes, $20,793, leaving a surplus of $297,882.

GRANBY CONSOLIDATED.

Blister copper turned out from the two smelters of the Granby during the calendar year 1916 amounted to 44,702,164 pounds, a new high record. The growth of the past few years is seen in the following (pounds):

1916	44,702,164	1915	40,670,598
1914	22,080,005	1913	21,511,747
1912	22,682,001	1911	*11,000,599
1910	20,017,048		

*Closed several months.

There was a drop of nearly a million pounds in December's copper yield from the previous month's total, due to the failure of equipment companies to make deliveries as promised of parts essential to the full operation of the new auxiliary power plant which Granby installed during the past year at a cost of $700,000. It was the purpose in making this installation to overcome the effects of severe winter weather which for a month or two made operations impossible at Hidden Creek.

CLAY PRODUCTS ASSOCIATION.

Hamilton, Wednesday, Jan. 24.—The Canadian National Clay Products Association opened their 15th annual convention at the Royal Connaught Hotel yesterday. Representatives from all over Canada are present, and it is expected that 250 will be in attendance before the convention is brought to a close on Friday.

The following officers were elected for the ensuing year: President Greaves Walker, Toronto; first vice-president, Thomas Kennedy, Swansea; second vice-president, William Burgess, Todmorden; third vice-president, Ryland H. New, Hamilton; secretary-treasurer, Gordon Keith, Toronto; (re-elected); councillors, C. B. Lewis, (Milton), D. A. Lochrie (Toronto), J. S. McCannell (Milton) H. Desjardines (Montreal), Walter Clark (Corunna), T. H. Graham (Inglewood), and C. A. Miller (Toronto), all re-elected; also one new member, G. A. German, Toronto.

J. Edward Frid of Hamilton, retiring president of the association, made the opening address, and the delegates were welcomed to the city by Mayor Booker. during the afternoon the ladies were given a motor trip through the city, while a number of papers relative to the clay industry were read at a short business session.

THUNDER MINING CO., LIMITED.

In submitting a report to the shareholders of the Wettlaufer Lorrain Silver Mines, Limited, President Henry Lockhart, jr., says:

"With respect to the option which was held by this company jointly with the Kerr Lake Mining Co., on the properties of the St. Anthony Gold Mining Co., Limited, at Sturgeon Lake, Ont., referred to in last year's annual report, your company did considerable exploration work on these properties in conjunction with the Kerr Lake Mining Co., Limited, this company bearing one-third of the expense. Your directors later decided that your company participate in the venture only to the extent of a tenth interest, and a new corporation was formed under the name of the Thunder Mining Co., Limited, in which corporation the title to the property is now vested. In due time your company will receive shares in this new company representing its interest."

MURRAY-MOGRIDGE.

Extensive plans for the development of Murray-Mogridge have been outlined, to be started immediately. These include the sinking of present shafts to greater depths, and developing the vein from various levels. The company already has on the property an adequate set of camp buildings, and for the past three months a force of men have been at work. Development to date has been confined to one vein upon which shafts have been sunk a distance of 2,000 feet apart to a depth of 50 feet. Arrangements have already been made regarding machinery and equipment for the aggressive campaign of development proposed.

The development of this property will be watched with much interest. The property consists of approximately 400 acres, situated on Wolfe Lake in the Sesekinika Lake District, and of this acreage only a fraction of an acre has been prospected. The work already done has put in sight some commercial ore, the values of which are very consistent. A recent sampling gave average values of $10.05 per ton.—Northern Miner.

SULPHURIC ACID IN 1916.

The production of sulphuric acid in the United States in 1916 was much greater than in 1915. The estimated production of sulphuric acid of strengths of 50 degrees, 60 degrees, and 66 degrees in 1916, expressed in terms of 50 degrees acid, is 4,475,000 tons an estimated increase over the production in 1915 of 600,000 tons, or more than 15 per cent. The increase was distributed about equally between acids of strengths of 50 degrees and 60 degrees, as there was a small decrease in the production of acid of strength of 66 degrees.

The most notable feature in the sulphuric acid industry was the enormous increase in the production of acids of strengths greater than 66 degrees. The estimate shows a production of these stronger acids of over a million tons as against a production of less than 200,000 tons in 1915. It is not feasible to express the amount of these higher acids in terms of 50 degrees acid; therefore the total given for them is in addition to the total given for acids of strengths of 66 degrees or less.

The estimated output of acids of strengths of 60 degrees and 66 degrees includes by-product acid produced at copper and zinc smelters. The output of acid so produced in 1916, expressed as 60 degrees acid, amounted to nearly 950,000 tons, or practically the same as in 1915. However, over 110,000 tons of acid of higher strengths was produced at these smelters, a quantity nearly double that produced in 1915.

The market conditions throughout the country are reported to have been on the whole better than in 1915, and the value of the product will probably be somewhat higher than it was even during that year of high prices.

The estimates are based on returns received by Philip S. Smith, of the United States Geological Survey, Department of the Interior, from more than 95 per cent. of the producers and on estimates of the outputs of the rest. It is believed that the figures are reasonable and that they will approximate very closely the final figures, which will be made up when the complete returns are received.

THE DEUTSCHLAND'S CARGO.

The Toronto Star, in a cable from London, signed by F. A. McKenzie, its correspondent, says:

"The following authoritative statement in regard to nickel sales has been issued: 'Canadian nickel was sold in the United States through the International Company only to firms signing a stringent guarantee against reselling for exporting. The precautions taken thereunder for supervision by the British and Canadian Governments proved satisfactory in every case save one, when the firm broke its bond and despatched a consignment of nickel through the Deutschland. This breach of faith was soon discovered. Any ordinary vessel would have been intercepted before reaching Germany. Immediate steps were taken, which, it is believed, render further breach impossible. Export of nickel from the United States is finally controlled by British officials, not the Mertons. Two certificates are necessary from the British Consul-General in New York and the British War Trading Department before exportation. Certificates are granted only after the most careful investigation of consignees. They are pledged not to resell."

A NEW ELECTRIC STEEL PLANT

Toronto, Jan. 16.—A $3,000,000 munitions plant for the Imperial Munitions Board is to be located on the new industrial site in Ashbridge's Bay. Yesterday the Toronto Harbor Commission completed the arrangements, and construction work will commence forthwith. It is stated that the plant will finally occupy sixty acres of the reclaimed land.

The plant will have an initial capacity of 300 tons a day. It will be erected to do electrical steel and forging work. The agreement was reached after a conference between the Harbor Commission and Mr. J. W. Flavelle and Colonel Carnegie of the Imperial Munitions Board.

In a statement handed out by the Harbor Commission last night it was stated that there will be ten 6-ton 3-phase 25-cycle Heroult type electric furnaces. Each furnace will consume about 2,000 horse-power. This power will be supplied by the Hydro-Electric Commission.

"It is expected that the ultimate use of the plant for commercial industry will require sixty acres of ground, with modern dockage and rail facilities all of which is being furnished in the Toronto Harbor industrial district in the vicinity of Cherry street.

"The plant will require from 800 to 1,000 men to operate it, and work will be started in connection with the foundations and erection of buildings on Thursday or Friday of this week, and it is expected that the plant will be in operation in July.

"The Toronto Harbor Commissioners are placing their entire Engineering and Construction Department organizations at the disposal of the Munitions Board."

TORONTO'S NEW STEEL PLANT.

Toronto, Jan. 30.—The Toronto Harbor Commission is wasting no time in getting the reclaimed portion of Ashbridge's Bay, at the foot of Cherry street, ready for the erection of the new steel plant for the Imperial Munition Board. Last Monday the work on the new railroad loop to serve the plant was started, and already a mile and a half of the metal has been laid. Yesterday there were 193 men clearing the site, laying water mains and preparing for the foundation. Pile drivers are being erected, and will be ready for the steel piling for the cement foundations. The harbor board will probably have to wait for steel as the pile drivers are about ready. As soon as the clearing is finished the ground will be broken for the cement foundations, and little difficulty should be experienced in this work.

TORONTO'S STEEL PLANT.

Commenting on the announcement that an electric steel plant is to be erected at Toronto "Iron Age," says:

An interesting development, showing intense efforts to increase Canadian output, is contracts closed by Imperial Munitions Commission for Canada for ten 8-ton Heroult electric furnaces for a plant to be built at Toronto, and to operate on scrap steel of munitions works. Several months will elapse before steel can be made, but the contract points to indefinite continuance of demand for war steel. These furnaces might add 100,000 tons a year to Canada's steel supply.

Canadian roads must come to this side for rails, as the two mills there are filled up on steel for the war. For the Grand Trunk, on both sides of the line, 50,000 tons has come up at Chicago, where total inquiries are about 200,000 tons, including 25,000 for government line in Alaska. Chile has bought 5,000 tons, and for Anaconda's operation in Peru 9,000 tons has been placed.

THE CANADIAN STEEL INDUSTRY.

Conditions in the Canadian steel industry have radically changed since the outbreak of war, whether due to artificial causes or not. These companies never had a proper provision of working capital, and never had the ambition or the opportunity to break into the export trade on aggressive lines. They were tied hand and foot by the banks, through excessive borrowings, and generally were considered as provincial one-horse shows.

One manufacturing company in Canada was in the habit of buying its lathes in the United States. When this company secured war orders the management tried in vain to purchase lathes in the States, and, in a moment of desperation, decided to try and make the machines themselves. So successful were they that they already have produced nearly 60 of these valuable machines. The same company got an order from the War Office for some hay presses, but what did they know about hay presses? Nothing! But they made the hay presses. And one of the officers of the company told me that they would not hesitate to build battleships if they got the chance. And he meant it.

A great change has come over our industrial operators since they have been thrown out of the beaten rut. Nothing will "Phase" them, and when the business of making tanks, shells and other war material has been suspended, the Canadian steel industry will be heard from in its ability to manufacture all kinds and conditions of material required abroad.

The steel companies have their treasuries full to overflowing with cash, and they owe the banks nothing.—Financial Times.

COKE OVENS FOR SYDNEY.

The Sydney "Post" reprints and gives prominence to the following item which was published some time ago in Pittsburgh:

"Announcements by officials of the H. Koppers Company, a local by-product ovens company, indicate that negotiations are now under way between themselves and the Dominion Iron & Steel Company, of Sydney, Nova Scotia, for the construction of a large number of by-product coke ovens which, it is said, involve a sum between $2,500,000.00 and $3,000,000.00. The ovens will be erected at Sydney, Nova Scotia, it was stated, but when work will begin is not known at present.

"The Dominion Iron & Steel Company, through extensive contracts, has need for the by-product ovens, it was stated. They will be built on the most improved plans, that the by-products from the coke can be extracted to full advantage.

"The Koppers Company is one of the largest concerns of its kind in the world and has received some of the largest contracts let recently for the erection of by-product ovens. To handle the Canadian order the local concern is arranging to increase their already large force for the work necessary on the plans."

THE COAL SHORTAGE.

The increased consumption of bituminous coal by the railroads and industrial interests of the country during 1916 brought about a condition in which the demand for coal was greater than the ability of the railroads to deliver it, and in some localities greater than the ability of the mines to produce it, because of scarcity of labor. There is no lack of coal in the ground, or of mines from which it can be obtained. The soft-coal mines, however, are not equipped to store coal that has been mined, and the coal must be loaded into railroad cars as soon as it is dug—in fact, the miners as a general rule do not go into a mine unless the cars are on hand to take the day's output.

The greater part of the bituminous coal produced in 1916 was sold on contracts at prices (agreed upon during the early part of the year) that represented increases little if any more than the increases in wages granted to the miners. The high prices at which the small quantity of coal not contracted for was sold during the last three months of the year were the result of excess of demand over supply. The buyers bid the price up, and as happens in the marketing of any article or commodity under like conditions, there was doubtless some speculative holding and trading that tended to raise prices. This factor and the inclination of the middleman and retailer to extract extra profits are not believed to have been any greater as regards coal than as regards other necessities whose prices have risen during the last few months.

The production and consumption of coal in the United States in 1916 broke all records, according to C. E. Lesher, coal statistician of the United States Geological Society, Department of the Interior. The quantity of bituminous coal mined last year is estimated as slightly more than 509 000,000 net tons, an increase, compared with the output in 1915, of more than 66,500 000 tons, or 15 per cent., and compared with the previous maximum, in 1913, of 31,000,000 tons. Data furnished by the Anthracite Bureau of Information indicate that the production of Pennsylvania anthracite was 88.312.000 net tons, about 600,000 tons less than in 1915. The total output of coal in the United States is thus estimated at 597,500,000 net tons, and the final figures when compiled may show 600,000,000 tons, compared with 570,000,000 tons in 1913.

AETNA EXPLOSIVES.

Aetna Explosives directors have passed the quarterly dividend of 1 3-4 per cent. on the preferred stock due at this time. The dividend has been paid regularly since April, 1915. No action was taken on accepting the resignation of President Kimball, and he will continue as president for the time being. It has been rumored for some time that the dividend would be passed, as the company was in need of working capital and, while the dividend was earned, it was decided to conserve the money for operation of the plants. Two plants which have been closed for some time, one of them the Drummondsville, Quebec, plant, have recently been placed in operation, thus creating further demands on working capital. According to one of the directors the company, as of December 1, last, had net quick assets of $11,000,000 and quick liabilities of $5,000,000, leaving working capital of 6,000,000.

VANADIUM STEEL.

It may sound extreme to say that the phenomenal development of the Ford Motor Co., was due to a smash-up at the automobile race at Palm Beach in 1905, and yet there is much truth in this statement.

At that race (one of the entrants was a Ford model "K," a high-powered six-cylinder car), a French car met with a serious accident, and after the smash-up Mr. Ford picked up a valve stem. The head of the Ford Co. marvelled at its lightness and strength. No one knew of what it was made. Ford said "we should have that kind of material in our cars if we're going to lead."

It was vanadium steel, and vanadium steel means meeting a 3,000 degree F., a temperature at which practically every furnace in this country at that time would melt itself.

The Ford Times for December continues the story as follows: "The United Steel Co. of Canton, O., (now the United Alloy Steel Corporation), which makes practically all of Ford vanadium steel, was at that time a concern struggling between competition of the larger companies. Mr. Ford told them: "If you will run a heat for us and see if we can get vanadium in there, I'll guarantee any losses which may occur.' That heat cost several thousands of dollars and was lost, but Mr. Ford was convinced it could be done—and the second test was a success."

The result was that steel with a tensile strength of 170.000 pounds was available instead of 60 000 to 70,000 pounds.

The light Ford car was then a possibility, and the United Alloy Steel Co's future was assured.

The Ford Co. is now making and selling 750,000 cars a year, and the United Alloy Steel Corporation to supply the needs of the automobile, railroad, equipment and other industries, has increased its capacity to 60.000 tons a month.—The Wall Street Journal Straws.

IMPERIAL OIL.

Imperial Oil of Canada's spectacular advance to 350, establishing a new high record, is in a class all by itself. The stock does not enjoy the wide interest that surrounds a listed security. Canadian transactions are few. New York, however, is ever on the alert and odd lots find ready buyers. As the dividend is 8 per cent., an explanation of present high price of the shares is believed to lie either in substantial increase in the dividend or the cutting of another "melon," as a year ago. The Imperial Oil Company is the Canadian subsidiary of the Standard Oil Company, whose "policy of silence" is world renowned. In March 1916, the Imperial Oil Company placed its $22.000,000 stock on an 8 per cent. basis. The preceding semi-annual dividend was 6 per cent. on $11,000.000 stock. In January, 1916 the company distributed a stock dividend of 100 per cent.—Financial Times.

CENSUS OF TECHNICAL MEN.

The Joint Committee of Technical Organizations (Ontario Branch) is sending out letters to some 2 000 technical men, explaining in detail the organization and the aims of the committee. Every technical man in the Province of Ontario who does not receive such a letter during the week ending February 3, is requested to communicate immediately with the secretary, Room 910, Excelsior Life Building, Toronto.

DOMINION STEEL CORPORATION LTD., IN 1916

Notwithstanding the serious reduction in one important branch of the business of the Dominion Steel Corporation, which will be referred to under its proper heading, the past year may be regarded as the most successful in the history of Sydney's greatest industrial organization.

During the whole year operations have been prosecuted with the greatest possible activity, and, with the exception already noted, to the full extent of the capacity of the various works controlled by the corporation. While no statement has been furnished of the financial results, it is generally understood that these exceed those of any former period. Larger amounts have been disbursed for wages than ever before and the earnings of individual employees are at the highest level ever reached.

In service to the Empire the corporation has played its part in furnishing materials for the manufacture of munitions and coal for use of transports and troopships, as well as by the personal services of thousands of its employees, many of whom can never return to their homes beside the sea and to their accustomed places in mine or mill.

Changes in Higher Offices.

Some notable changes have occurred in the higher offices of the corporation and its constituent companies.

In January Mr. J. H. Plummer, much to the regret of those who had worked with him and under him during the long period of his connection with the Steel and Coal companies, resigned the presidency of the corporation, and was succeeded by Mr. Mark Workman, who has been a member of the board over which he now presides, since the stormy days before the merger of the companies. Mr. Workman has long held a prominent place in business and financial circles, and has brought to his new task qualities of mind and character that cannot fail to make a marked impression on the future of the corporation.

On the first of March, Mr. D. H. McDougall, who for several years had been general manager of the Coal company, was appointed to the same office in the Steel company, and so became the chief executive officer of the corporation in respect to the operation of all its constituent companies.

Dominion Coal Co., Limited.

A resume of the coal trade of 1916 and the past decade was published in the Jan. 15 issue of this journal, and need not be mentioned here.

Dominion Iron and Steel Co., Limited.

The conditions prevailing at the close of 1915 have not materially changed, except that a slightly larger proportion of the company's output has been absorbed for domestic use, and the production of materials for munitions has greatly increased. Exports of rails were considerably less than in the preceding year, but exports of other materials such as wire rods, barbed and plain wire and wire nails have been maintained upon the same generous scale that was established in 1915.

The output of pig iron and ingots, which may be taken as a fair measure of the operations of the works, were larger than those of the previous year by about 12½ and 6 per cent., respectively. The tonnage of ingots produced is the largest attained in any calendar year in the company's history.

The figures in the following table of outputs are approximate, having been made up some days in advance of the close of the year:

	Tons.
Pig iron	348,000
Steel ingots	376,000
Blooms, billets, etc., for sale	150,000
Rails	17,495
Wire rods	112,400
Merchant bars	9,950
Wire and products of wire	47,500

The ore mines at Wabana and the Limestone and Dolomite quarries in Cape Breton and Newfoundland were kept in active operation during the summer months, and some work was done during the winter in the ore mines. The quantities produced are as follows:

	Tons.
Iron ore	805,000
Limestone and dolomite	471,000

Improvements, Extensions, Etc.

Large expenditures have been made during the year for improvements and extensions of plant, as well as for renewals. The principal items of new construction were for purposes related to the production of shell steel, and include the installation of a third Bessemer converter, the erection of a 250 ft. extension to one of the mill buildings for the housing of a battery of heavy steel cutting machines and the addition of a large number of smaller machines for the same purpose in other existing buildings. The facilities for recovery of benzol and other hydrocarbons were further increased and improved.

In the blast furnace department arrangements have been made for the rebuilding of No. 1 furnace on larger and more modern lines. A new electric driven ore bridge is being erected over the stock yard and the stock bins have been thoroughly overhauled and renewed.

In the open hearth department, in addition to a number of lesser improvements and renewals, eight of the big furnace stacks have been completely rebuilt.

In the mills and yards new cooling beds have been erected, new tracks laid and new locomotive cranes provided to cope with the increasing tonnage which has to be handled.

A contract has just been concluded for the erection of a number of coke ovens of the most modern design, which, when complete, will increase the output of coke and make possible a larger production of pig iron.

Outlook.

Prospects for the new year, so far as can be judged at the present time, are hopeful.

The volume of the coal trade will be limited, chiefly by the shipment facilities, and to a lesser extent, by the number of men available, but this limitation will diminish as new men become more expert in the work of mining.

The tonnage of steel on order is sufficient to keep the works actively employed for several months, and so far there is no indication of any slackening in the demand for all the materials that the company can produce.

BOSTON CREEK.

The O'Donald group of claims comprising approximately 190 acres between the Boston Creek gold mine and Boston Hollinger property, was placed under option to Mr. H. J. Stuart, representative of the Crown Reserve Mining Company of Cobalt. The option price is a large one. A force of men have already commenced surface work, and erection of camp buildings, preparatory to carrying on an extensive development campaign. The main veins of the Boston Creek, the R. A. P. Syndicate, and the Boston Hollinger are in evidence on the O'Donald property.—Northern Miner.

HOLLINGER CONSOLIDATED.

The very aggressive exploration and development campaign which is being conducted by the management of the Hollinger Consolidated is resulting in the discovery of more new ore bodies, and proving up to a still greater extent the bodies already known to exist. The growth of these ore bodies in length and depth keeps pace with the rapidly lengthening drifts, raises and winzes.

On the Acme side, adjacent to the McIntyre line, the large ore bodies at the 800-ft. level are proving highly satisfactory as development work proceeds.

A 900 foot crosscut that will tap all the area lying west of Pearl Lake is being driven from number eleven shaft to number twelve shaft. The area through which this crosscut will pass has, owing to the heavy overburden, never been explored on the surface, and it is considered quite probable the underground field of mining will be greatly broadened by this operation.

On the 425-foot level, which will continue to be the main haulageway of ores for at least another two years, considerable opening up and extending of works has been accomplished with very favorable results. A very important vein, which is known to be over 1,000 feet in length on surface, but which had not been hitherto tapped underground, has been cut in an east crosscut on this level, where it contains average values of $12 per ton across a width of seven feet.

Another very important development has been that of opening up the vein under Miller Lake. This vein which is also seven feet in width, is being drifted on. Up to the present three hundred feet of high-grade ore has been opened up, and the drift is still in ore.

The central shaft equipment is nearly all completed and the big electric hoist is being set up. Also at the 425 foot level, a large electrical pump has been installed. This displaces the seven air pumps which have hitherto been employed at this level, and thereby cuts out a large air consumption which can in the future be used to better advantage in other directions.

The mill extension is being pushed rapidly forward. The cyanide end is completed, and the tanks are now being placed. The main mill building is also completed, and the machinery is in the course of installation. The transportation of ore from the central shaft, including four ore storage pockets, is about completed, only the trestle work yet remaining to be connected to the mill.

The Hollinger is developing at a depth of 1,250 feet. At the 425 foot level over a mile of tramway is operated by electricity. Approximately 1,300 men are on the company's pay roll.—Cobalt Nugget.

AURUM MINES, LIMITED.

Toronto, Jan. 30.—At a meeting of the Aurum Mines, Limited, the following were elected as first permanent directors: President, Sir H. Pellatt; vice-president, Col. J. B. Miller, president Polson's Iron Works; W. B. Reid, president United Cigar Stores; E. J. Blackman, manager Dodds Medicine Co., and A. H. Jaffray, assistant manager Polson Iron Works. The Aurum claims adjoin the celebrated Croesus property in Munro Township. Camps have been erected and one shaft is down 25 feet. The vein was three feet wide on the surface but had widened to five feet at the 25-foot depth. No offering of the company's shares is to be made at present.

DOMINION COPPER PRODUCTS.

The plant of the Dominion Copper Products Company at Lachine was built last winter to supply the copper and brass parts of ammunition, and when peace is declared we may expect it to continue to manufacture, but for other purposes, copper and spelter that has been mined, smelted and refined in Canada. An illustrated description of this plant by Mr. L. J. Krom appears in the November number of The Metal Industry from which the following notes are taken.

The plant was built last winter, and was put in operation only eight months from breaking the ground, a very creditable performance as it was impossible to buy much of the machinery, which was therefore made in the works. The plant contains a casting shop with one hundred crucible furnaces for melting copper and brass. In this shop are cast the copper tubes for making driving bands for small shells and brass bars for the manufacture of cartridge cases. From the casting shop the metal goes to the tube mill and brass rolling mill. Here are placed the drawing presses, rolls, annealing furnaces, 'overhauling' machines, saws, pickle tubs and other appliances. In another building is a reverberatory furnace for refining scrap copper, and a casting machine. Here is also a 1,200-ton press for piercing and drawing into tubes the copper billets made from this furnace. In addition to the above is a large building provided with lathes for cutting copper bands from the seamless tubes and presses for cutting cartridge disc from the sheets of brass. The ashes from the casting shop are treated in a separated building to recover the metal contents.

The executive of the Company includes Mr. G. H. Duggan, President; Mr. H. H. Vaughan, Vice-President and General Manager, and Mr. F. Deming, General Superintendent, while Messrs. T. West and F. Gardner late of the Metallurgical Department of McGill University have charge of the chemical and metallurgical interests of the plant.

LAKE SHORE.

According to the "Northern Miner" another issue of Lake Shore treasury stock will be made. The money received from the issue will be to carry on a more active development campaign and help pay the cost of building the mill, a proposal for 1917. In fact it is understood that the plant has been ordered.

On the property a shaft has been sunk to the 300 foot level, at which depth over 600 feet of drifting, 160 feet of crosscutting and 36 feet of raising has been done during the past year, and on the 100 foot level over 100 feet of drifting. Some veins showing excellent values have been uncovered, assays averaging $18 a ton, and it is estimated that over 300,000 worth of ore has been put in sight above the 300 foot level during the last year. The company has spent $82,102 on development work.

DOME.

To provide for mill extensions that will increase the output and decrease the average cost of production per ton, the Dome Mines Co. are planning to issue about $500,000 worth of the treasury stock now unissued. There is a million dollars worth par value of stock now in the treasury, and less than half of this will be taken to close the option on Dome Extension, which latter is generally regarded as a foregone conclusion.

UTICA MINES, LTD. BRITISH COLUMBIA.

The Utica Mines, Limited, operating the Utica group of ten claims, seven miles from Adamant siding on the Kaslo-Slocan branch of the Canadian Pacific railway, British Columbia, has enjoyed a prosperous year and is now in such physical and financial shape that a long period of profitable operation seems assured. Shipments for the year were 983 tons of silver-lead ore, averaging about 22 per cent lead and 170 ounces silver to the ton and 75 tons of zinc ore averaging approximately 43 per cent zinc and 145 ounces silver. The property is developed by 3,600 feet of drifts on the vein and 550 feet of crosscuts. The deepest level is 1,200 feet below the outcrop at the top of the ridge, and at this depth the vein has been developed with most satisfactory results. Another level, about 350 feet vertically lower, was started two months ago and will be driven to the vein during the winter. Ore is being stoped from two levels. Utica Mines, Limited is capitalized for $2,000,000 in $1 shares, its largest shareholders being George H. Aylard of Victoria, B. C., president and managing director of the Standard Silver-Lead Mining company, and Charles F. Caldwell of Kaslo, B. C. The company is said to hold a cash reserve of approximately $40,000.

The British Columbia correspondent of the Canadian Mining Journal writes: Two erroneous statements printed recently in several British Columbia newspapers are (1) that the total amount of dividends paid by the Hedley Gold Mining Co. in the last five years was $780,000, and (2) that the increase in ore receipts at the Consolidated Mining and Smelting Co's smelting works at Trail, B. C., in 1916 as compared with those of 1915 was 17,572 tons. As to the former, the total of dividends paid during five years, 1912-1916, was $1,560.000, which is just twice as much as that given in the New York story reprinted in British Columbia. Then, the total quantity of ore received at the Trail smeltery in 1916 was 486 688 tons, while that in 1915 was 441.085 tons, according to figures given in the statements of ore receipts for those years, respectively, supplied weekly by the company. The increase for 1916 over 1915 was, therefore, 45,603 tons, or a little more than ten per cent.

The United States Bureau of Mines, Washington, D. C., is compiling a new glossary of mining terms, and in order to have it complete sixty different glossaries have been studied and selections from them are being embodied in the new compilation. The glossary which will be published eventually by the Bureau of Mines, will also include a lengthy list of Spanish mining terms.

The result of the election held recently by members of United Mine Workers of America, District 18, which has jurisdiction over many of the coal mine workers in the Province of Alberta and the Crowsnest district of British Columbia, was announced at Fernie, B. C., on January 9, as follows: President, W. G. Graham; secretary-treasurer, A. J. Carter; international representative, David Rees. The district board members are: W. Sherman, Fernie, sub-district No. 1; J. Johnston, Coleman, Alberta, sub-district No. 2; C. J. Phillips, Coalhurst, Alberta, sub-district No. 3; Frank Wheatley, Bankhead, Alberta, sub-district No. 4.

BOOK REVIEWS.

THE WORLD'S MINERALS. By Leonard J. Spencer. Frederick A. Stokes Co., New York, Price $2.75. For sale by Book Department, Canadian Mining Journal.

This book is for the most part devoted to the description of 116 species of the more common minerals. Colored illustrations of 163 specimens are given and assist the text greatly. The aim of the author is to draw attention to such of the more prominent characters as will help the student to identify miners. Mention is also made of the uses of the chief minerals.

THE FUNDAMENTAL PRINCIPLES OF PETROLOGY. By Dr. Ernst Weinschenk. Translated by Albert Johannsen, McGraw-Hill Book Co., 1916. Price $2.50. For sale by book department, Canadian Mining Journal.

Dr. Weinschenk's elementary treatise has been for some years recognized as one of the most useful for those beginning the study of petrology. The translator has rendered a distinct service by making the work accessible to a larger number of English speaking people.

PRINCIPLES OF OIL AND GAS PRODUCTION. By Roswell H. Johnson and L. G. Huntley, John Wiley & Sons. 1916. Price $3.75. For sale by book department, Canadian Mining Journal.

This is a discussion of the subject with reference to American conditions. The authors have attempted to treat more fully the newer, less developed topics and less fully those that have a literature. Methods of locating and extracting oils are given prominence.

SILVER AND GOLD. A pictorial Souvenir of the Mines of Northern Ontario, The Cobalt Daily Nugget, 1916.

This is a well illustrated booklet devoted to silver and gold mining industry. An introduction summarizes briefly the record of Cobalt and Porcupine The greater part of the book is made up of reproductions from photographs of mining properties. A brief account is given of the operations of the several companies.

FIELD GEOLOGY. By Frederic H. Lahee. McGraw-Hill Book Co., 1916. Price $3.00. For sale by book department Canadian Mining Journal.

The author has aimed to write a book that will be useful not only to students of geology, but also to engineers whose interests bring them into touch with geologic problems. An elementary knowledge of geology on the part of the reader is assumed.

Attention is directed to means of recognizing and interpreting geologic structures and topographic forms. A number of keys and tables are presented to assist the observer in identifying various forms and structures. Methods of geologic surveying, the nature and construction of maps, etc., are discussed in some detail. An appendix contains several useful tables and other data in form convenient for reference.

At a meeting of the shareholders in the Noonday Mines Co., operating the Noonday Silver-lead mine, situated near Cody, Slocan district of British Columbia, Mr. Bruce White of Sandon, Slocan, was elected president of the company; Mr. R. C. Lammers, of Spokane, Washington, vice-president; Mr. John B. White, also of Spokane, treasurer, and Mr. H. S. Burdick a director.

FATALITIES IN BRITISH COLUMBIA MINES.

Three men were killed in collieries during the last quarter of 1916, compared with five in 1915. Fatalities in coal mines in 1916 totalled 28, against 52 in 1915.

Fatalities in collieries in 1916 were: Canadian collieries (Dunsmuir), Ltd., Cumberland, 6; Pacific Coast Coal Mines, Limited, South Wellington and Morden, 2; Fuel Co., Nanaimo, 3; Crows Nest Pass Coal Co., Coal Creek, 5; Crows Nest Pass Coal, Michel, 12. These 12 lives were all lost in the one accident at Michel in August.

Cause of deaths in coal mines were: By falls of rock and roof, 7; by falls of coal, 3; by mine cars and haulage, 5; by asphyxiation in mine gases, 1; by explosion, 12. None was killed on the surface during the year.

Number of men killed in the metal mines of British Columbia during the final quarter of 1916 was six, one less than in the corresponding quarter of 1915. The total for the year was 20, four more than in 1915.

Metal mines at which fatalities occurred in 1916 were: Iron Mask, Kamloops, 1; Granby, Phoenix, 4; Granby, Anyox, 5; Britannia, Howe Sound, 5; Silver Queen and Ruby, Atlin district, 1; Le Roi, Rossland, 1; Hewitt, Slocan, 1.

The number of deaths in metal mines from the various causes: By falls of ground, 6; by falling into chutes, winzes, etc., 2; by cage in shaft, 1; by mine cars and haulage, 2; by asphyxiation from powder fumes, 2; by returning on unfired shot, 1; by premature blast, 2; by electricity, 1. One was killed on the surface by being hit by flying rock and two from being struck by broken compressed air pipe.

PORCUPINE CROWN.

At present mining operations at Porcupine Crown are centred largely in drifting on the 800-ft. and 900-ft. levels.. Development of these levels has proven quite satisfactory. Also at the 200 foot level, considerable opening up has been done with satisfactory results.

During the year the mine outgrew its milling equipment, making it necessary to install a new primary crusher and also a new main hoist. The 20 stamps are now able to handle a maximum of 180 tons daily. The general average being around 150 tons. Approximately 120 men are employed at the Porcupine Crown. —Cobalt Nugget.

PORCUPINE IN 1916.

In an article written for the Toronto Globe, Mr. Arthur A. Cole says:

"The general development in the Porcupine camp has been very satisfactory. Besides considerable additions to the ore reserves of the two larger properties, the Hollinger and the Dome, the year has been noteworthy on account of the important ore bodies located on the 1,000-foot level of the McIntyre Extension, the 100-foot level of the Schumacher, and between the seventh and ninth levels of the Porcupine Crown, in all cases adding materially to the value of the mines."

"The properties making up the production of nine million dollars in 1916 were: Hollinger, Dome, McIntyre, Porcupine Crown, Vipond, Schumacher and Dome Lake."

"Around these producers a considerable number of promising prospects are being tested out by diamond drill or mining, and besides these, many others are operating both in Deloro and Shaw, and some activity is also shown to the north of Porcupine Lake. From this development work we may expect to have several more mines added to the list of producers within the next twelve months. Considering present war conditions, it is remarkable that so much activity is being shown in this district, and if the times were normal this would soon assume the proportions of a boom."

DIVIDENDS FROM NORTHERN ONTARIO GOLD AND SILVER MINES.

The dividend record of gold and silver mining companies operating in Northern Ontario, as shown in a recent number of the "Northern Miner" is as follows:

Dividends paid in 1916—

Cobalt	$4,958,650.84
Porcupine	8,920,000.00
Kirkland Lake	260,750.00
	$9,139,400.84

Dividends paid to date, December 31st, 1916—

Cobalt	$67,318,853.13
Porcupine	8,922,000.00
Kirkland Lake	325,937.50
	$76,566,790.63

Dividends paid by Cobalt mines to Dec. 31st, 1916—

Mining Company.	Amount of Dividends and Bonuses paid during 1916.	Total Amount of Dividends paid to Dec. 31st, 1916.
Beaver	$ 60,000.00	$ 650,000.00
Buffalo		2,787,000.00
Caribou Cobalt (Drummond)		225,000.00
Casey Cobalt		203,249.33
City of Cobalt		139,321.42
Cobalt Central		192,845.00
Cobalt Lake		465,000.00
Cobalt Silver Queen		315,000.00
Cobalt Townsite		966,726.31
Coniagas	600,000.00	8,440,000.00
Crown Reserve		6,102,399.30
Foster		45,774.00
Hudson Bay (Temiskaming and Hudson Bay)		1,940,250.00
Kerr Lake (Holding Co.)	600,000.00	6,570,000.00
LaRose (Holding Co.)	299,725.40	6,891,708.59
Mining Corporation	570,615.00	1,348,740.00
McKinley Darragh Savage	269,723.04	4,876,474.30
Nipissing Mines Co. (Holding Co.)	1,500,000.00	15,340,000.00
Peterson Lake	168,127.40	420,318.50
Right of Way Mines	16,855.00	235,965.00
Right of Way Mining Co.		324,643.93
Seneca Superior	598,605.00	1,579,817.20
Timiskaming	225,000.00	1,684,156.25
Trethewey	50,000.00	1,111,998.50
Wettlaufer		637,465.50
Private Corporations		3,825,000.00
	$4,958,650.84	$67,318,853.13

Dividends paid by the Porcupine and Kirkland Lake gold mines to December 31st, 1916—

Mining Company.	Amount of Dividends and Bonuses paid during 1916.	Total Amount of Dividends paid to Dec. 31st, 1916.
Dome Mines	$ 800 000.00	$1,200,000.00
Hollinger Gold Mines	2,880,000.00	7,050,000.00
Porcupine Crown Mines.	240,000.00	660,000.00
Rea Mines		12,000.00
	$4,180,750.00	$9,247,937.50

"ALIEN" OWNERSHIP IN BRITISH COLUMBIA.

Northwest Mining Truth, published in Spokane, Washington, which city is the headquarters of a number of mining companies operating in Kootenay district of British Columbia, last month printed the following:

Mining Truth devoutly hopes that the new government of British Columbia will do nothing to interfere with the mining prosperity of the province, which seems destined to reach record levels this year, if undisturbed. It notices, however, that a delegation recently called upon the Premier and Minister of Mines to discuss methods which might be adopted to improve conditions and that the "alien" ownership bugabo was once more injected into the situation.

British Columbia would do well to remember that development of its mining resources to the present satisfactory stage has been brought about almost wholly by aliens from this side of the line. Outside of the Canadian Consolidated Mining and Smelting company, practically every heavy corporation operating mines in the province has been financed by foreign capital. It would seem to us that just at this time particularly every inducement should be offered for employment of capital, domestic or foreign, in further expansion of latent resources.

It is of course, quite natural that loyal citizens of a country at war should wish to prevent use of its resources against itself. This can be accomplished, however, by surer and more modern means than by denying foreign capital entry into the country. For instance, provision of refining capacity and heavy export duties would prevent metals from leaving the country and would thus preserve them for the Empire's use, no matter what brand of capital had been used in producing them.

We were much interested in the announcement of the Minister of Mines that he is in favor of supplying one or two government smelters for use of mines at interior points. Theoretically, this would be an ideal solution of the producers' troubles, but we fear that in practice it would prove most expensive and entirely abortive.

Encouragement of foreign capital by every legitimate means would seem to us to be the logical course for British Columbia in the present serious state of the Empire's business affairs. Capital can always be controlled, at least in so far as its product is concerned, but the slightest inclination to adoption of narrow-minded policies will result in driving foreign capital so far away that it may never be coaxed back.

Premier Brewster and Minister of Mines Sloan would do well to think twice before they act along the lines indicated in press reports of the recent meeting. Further than that they might profitably confer with leading mining men of the province—men who are really developing its mining resources and, therefore, know something of the difficulties met with in securing adequate capital. Without casting reflections upon the prominent gentlemen who comprised the recent delegation, it appears quite patent that neither has had much actual experience in the development of mines, and is therefore apt to expound theories constructed in the comfortable vicinity of a swivel chair.

SLOCAN STAR MINES, LTD., B.C.

The fifth annual meeting of the Slocan Star Mines Limited, was held in Vancouver, on December 27, Mr. R. S. Lennie, president of the company, occupying the chair.

The report of the directors stated the year had been an important one, in that adequate mine and mill equipment had been supplied, and although unavoidable delays occurred in its installation it had been completed and will permit of operation to full capacity the year round. Shortage of water and power at certain seasons of the year has detrimentally affected development and production, but those difficulties have been overcome and the plant had been paid for by sale of debentures, whereby an issue of $100,000 was made by 7 per cent. bonds. A market was found for the zinc concentrate on hand at date of last report, giving a gross return of $35,271.63, and lead concentrate had since been produced amounting to $113,536.66, which resulted in a net smelter value of $85,109.01 or $89.41 per ton, while lead slime amounted to $7,438.90, of a net smelter value of $5,364.69, or $73.32 per ton. Crude ore was shipped, amounting to $10,059.55, giving a net smelter value of $8,001.31, or $119.57 per ton. Zinc concentrate shipped gave a net value of $5,139.05, or $9.01 per ton.

The unsatisfactory zinc return necessitated the improvement of the plant and the adoption of a process determined upon after numerous tests and investigations. Development consisted of 1,609.4 feet of drifts, raises and crosscuts in the different levels of the mine and the directors expressed themselves as confident that the recent developments, improved markets, metal prices and improved equipment for handling and saving products, should during the new year, result in much better returns and more profitable operations.

The balance-sheet showed profits for the year of $16,619.18, which will mainly be applied towards the liquidation of the debenture issue.

The directors were re-elected, the board consisting of: Messrs R. S. Lennie of Vancouver, president; A. C. Burdick, Victoria, vice-president; T. S. McPherson, Victoria; J. Elliott, Vancouver; J. B. White and J. B. McGoldrick, Spokane; and J. M. Harris, Sandon.

THE ONLY PEACE.

They come to us with dripping hands,
  Blood stains the "olive branch" they bear,
Trampling across the ravished lands
  Where tortured peoples know despair,
They prate of peace whose brutal grip
  Still holds the realms we swore to free;
The cracking of the slaver's whip
  Still mocks the plaint of liberty.

Deep down beneath the ocean waves
  The pirates' murdered victims sleep;
By many a thousand British grave
  In spirit still our watch we keep.
And now the bully in his pride
  Would bid the hand of vengeance stay,
Knowing the signs that well betide
  The dawning of our brighter day.

By all our dear and splendid dead,
  By all the blood and all the tears
That British hearts and eyes have shed
  In our long agony of years,
There is no ending to the fight
  Till, smitten by the final thrust,
The powers of darkness and of night,
  Are spurned and trampled in the dust.

—Touchstone, in London Daily Mail.

McINTYRE PORCUPINE MINES, LIMITED.

The following letter to shareholders was issued Jan. 19, 1917, by President A. M. Hay:

I beg to advise you that at the special general meeting of shareholders held here on 28th December last, consolidation of the McIntyre group of properties on the basis set forth in my letter to shareholders, dated 4th December, 1916, was unanimously approved of, and the necessary steps have been taken by all the companies interested to carry the same into effect.

The nominal capital of this company has been increased by one million shares, of which 294,000 shares have been issued to the McIntyre-Extension Company, and 316,298 shares to the McIntyre-Jupiter Company, against transfer by these companies of all their property and assets, which are now vested in this company:

The following is a memorandum of production and operations for the quarter ended 31st December, 1916: McIntyre ore—Tons milled, 33,558; value per ton, $10.62; gross value, $356,504; recovery, $340,194; operating cost, $151,420; per ton, $4.51; operating profit, $188,773. Custom ore—Tons milled, 5,811; profit from milling custom ore and from subsidiary company operations, $20,216. Total milled, 39,369 tons. Total profit, $208,990.

Construction—The amount expended during the quarter on McIntyre and McIntyre-Extension properties for mine equipment, buildings and plant amounted to $46,242. This expenditure was largely in connection with operations at the main shaft, including crusher house, ore bins, aerial tramway and terminals at main shaft and mill.

No. 4 Shaft—13,330 tons of ore of an average grade of $7.20 per ton, equal to about 40 per cent. of the total tonnage of McIntyre ore milled, came from these workings. No important ore bodies were encountered in the workings south from this shaft.

No. 5 shaft—The raise from the 1,000 to the 700 foot level of this shaft was completed. Stations have been cut at 800 and 900 ft. Crosscuts are now being driven to reach the ore bodies already located on these horizons by diamond drilling, and to connect with ore passes to the main system of transportation on the 1,000 ft. level to the main shaft. Advances have been made east and west on the 600 ft. and 700 ft. levels on No. 5 vein and on vein No. 714. All the faces continue in high grade milling ore.

Main Shaft—Drifting east and west on the boundary vein on the 1,000 ft. level on McIntyre and McIntyre-Extension ground has been advanced for a total length of 670 ft, over 550 ft. being in high grade milling ore. Production of ore and development on this level has been curtailed pending completion of the new hoisting and transportation equipment. Stoping operations now going on show a width of from 8 to 40 ft. of ore averaging over $15 per ton. Drift No. 1026 on the McIntyre-Extension ground on the 1,000 ft. is now within 233 ft. of the Jupiter boundary line, the present face is in ore assaying over $10 per ton. Work on this drive to the east will be pushed in order to test the ground on Jupiter west lot at this level and ultimately to connect the main shaft with the Jupiter shaft and workings on the Jupiter east lot.

McIntyre-Jupiter Mine—During the quarter 5,469 tons of ore from this property were milled, at an average value of $13.25 per ton, resulting in a gross profit of $23,081.60. Under the terms of consolidation this and all profits previously earned by the McIntyre-Jupiter Company become the property of the McIntyre-Porcupine Company.

Milling Operations—The installation of the new hoisting and crushing plant at the main shaft has been held up on account of delays in delivery of plant. The aerial tramway has, however, been completed and tonnage of ore to the mill has been increased since the first of the new year, and has now reached 500 tons per day.

Plenaurum Mine—As reported at the special general meeting of shareholders held on 28th ultimo, your directors have secured, under option, a controlling interest in the Plenaurum property, consisting of 120 acres, for a period of twelve months from 8th December, 1916. This property adjoins the Jupiter mines, recently absorbed by the McIntyre Co., and stands in the same relation to the large body of quartz porphyry underlying Pearl Lake as the Hollinger, McIntyre Extension and Jupiter properties. A considerable tonnage of high grade ore has already been developed on the property. Under the above conditions your directors feel that they would not have been acting in the best interests of the shareholders had they neglected the opportunity of securing an option on a property with such potentialities.

Dividend—At a meeting of the directors held here to-day, a dividend of five per centum was declared on the outstanding capital stock of the company, payable on the 15th day of February to shareholders of record at the close of business on the 5th day of February, 1917.

HYDRAULIC RESOURCES.

In estimating the value of Canada's hydraulic resources and their importance with reference to future industrial development, the extent to which electrochemical processes have entered into some phases, at least, of nearly every branch of our industrial life is not generally appreciated.

A small beginning in our electro-plating, two generations ago, has developed until the great bulk of the copper output of the world is electrolytically refined. The electrolysis of common salt is the basis of the electrolytic alkali industry, the products of which are caustic soda, metallic sodium, chlorates, and hypochlorates. The electric furnace has created a host of new industries, producing chiefly abrasives, graphite, silicon, ferro-alloys, refined steel, phosphorus and calcium carbide. It has also been tested experimentally as a competitor of the combustion furnace in the metallurgy of many metals.

Used as an electrolytic furnace, we have the very important application to the production of aluminum. The industrial use of electric discharges through gases is still in its infancy, but we have ozone and nitric acid among the products, the former used for sterilization, and the latter as a basis for fertilizers and explosives.

Every one of these industries consumes large quantities of energy. Whereas the refining of lead requires only 120 k.w.h. per ton, we have consumptions as high as 4,000 k.w.h. per ton for other metals. The aluminum furnace requires 25,000 k.w.h. per ton of product.

The electro-chemical industries have grown to be of great value to countries which possess good opportunities in water power resources, as they have a fundamental interest in the development of cheap power. —L. G. D.

FOGHORN MACDONALD.

The following was published in the December bulletin of the Canadian Mining Institute:

Probably no man connected with the Canadian forces, not even Sir Sam himself, has become so widely known as our good friend 'Foghorn' Macdonald. He is also universally popular which does not always go with notoriety. Stories of him and of his prodigious vocal development are now appearing with frequency in the American newspapers, and during the past few weeks the present writer has accumulated nearly a drawerful of cuttings sent to him by members and others from practically every corner of the continent, recounting the exploits and escapades of the redoubtable Neil. The stories are intended to raise a smile and they do raise a smile. That is one of Foghorn's virtues that he is a great dissipator of gloom—a delightful optimist. But apart from their humour, if one analizes these tales one finds something else, something very big and fine and at the same time typical of the free democratic spirit that animates the whole Canadian Armies. It is an indomitable spirit that cannot be crushed or daunted, and it is a chivalrous, humane spirit that does not hate, that cannot understand hate in the German sense, but nevertheless is implacable and untiring. Of Foghorn and the many good men like him we, his fellow members in Canada, are immensely and justifiably proud, and we like to read yarns about them such as this. "How are things going at the front," a journalist asked Foghorn, on leave in London. "Going!" said he "Why the boys are getting so gay out there one of our battalions came parading up to the front line trenches the other day with a brass band playing for all it was worth. They were right where you could get killed any minute, too, and even my old hoss thought they were crazy. Guess I'll be getting back to the front soon myself," he concluded, with a sigh; "this quiet life of London is getting on my nerves." And this is a man well on the wrong side of fifty, who enlisted as a private. All his friends rejoice to know that his sterling worth has been recognized, that he has been again promoted and now holds the rank of major.

It is stated that the Tonopah Mining Co., a Philadelphia organization, which is developing a mining property at Schist Lake, via The Pas, Manitoba, is arranging to take out 5,000 tons of copper ore this winter, haul it to Sturgeon portage 38 miles, convey it thence by water to The Pas and then ship it by rail to Trail, B. C., for smelting at the Consolidated Co's smelting works.

On January 12 the Trail News stated that a section of the Consolidated Mining and Smelting Co's electrolytic lead refinery at Trail, B. C., was then being used for copper refining. Erection of the structural steel for the addition being made to the company's electrolytic copper refinery, to increase the daily capacity to 17 tons, had then been just completed.

Night classes for instruction in mining and associated subjects have been opened at Nelson, B. C., and are being attended by prospectors, high-school students, and others. Mr. W. E. Cook, of the Nelson high-school staff is instructor, and his list of subjects includes mineralogy, mine geology, blowpipe analysis, explosives and their use, principles of mining, metallurgy of the common metals, and ore-dressing.

DEATH OF COL. A. M. HAY.

Toronto, Jan. 22.—Col. A. M. Hay, president of the McIntyre Porcupine Mines, and director of many others, died at 6 o'clock Saturday, Jan. 20. He had been ill only a short time.

Col. Hay was born in Scotland, October 25, 1859, and upon maturity became interested in the shipping business in which his father was engaged. He came to America in 1890.

Col. Hay's first American enterprise was to organize an English company—the Isle Royale Land Corporation—to purchase the island of that name in Lake Superior. The Wendigo Copper Company was formed as an auxiliary for mining purposes on the island. He was managing director of these companies till 1896 when he purchased the Mikado mine in Ontario and resold it to an English company.

He afterwards organized the Dominion Gold Mining and Reduction Company another English corporation, with works at Rat Portage, Ontario, of which he was managing director, and made his headquarters there for about ten years, during which time he was engaged in various mining enterprises in Mexico, the United States and Canada. He entered the Cobalt district in 1906, and has been identified with the mining and development of Northern Ontario ever since. He was president of the Trethewey Silver Cobalt Mine, Limited; the Northern Exploration Co., Limited, and the McIntyre-Porcupine Mines, Limited, and a director of various other mining and industrial corporations.

Col. Hay became president of the McIntyre Mines in May, 1915, when the old company was reorganized with a new directorate. Under the able guidance of the new directors with Col. Hay as their head great strides were made until to-day the McIntyre Consolidated Company is one of the biggest producers in the north country and is a worthy rival of the famous Hollinger and the Dome.

Until two weeks ago Col. Hay was in Toronto at the office directing the affairs of the company. He went north to his home in Haileybury on account of a slight indisposition. In order to get some information with regard to the quarterly report, which was to be issued he went up to the mine and there contracted pneumonia.

Col. Hay was widely known in the business world and was universally liked. In politics he was a Conservative, and in religion a Presbyterian. His home was in Haileybury. He had no children.

TO ENCOURAGE HOME REFINING.

Ottawa, Jan. 8.—It is foreshadowed that legislation will be introduced this session looking to the development of the refining of lead, copper, and zinc, so that the Empire may not have to depend on foreign sources of supplies in war time for these metals, indispensable in munitions manufacture. For several months officers of the finance department have been inquiring into the metallic industries with this end in view.

LAKE SHORE MINE.

New surface plant at the Lake Shore mine, Kirkland Lake, is now in operation. It is expected that work will soon be started on a mill.

PERSONAL AND GENERAL

Mr. A. A. Cole has been nominated for re-election as president of the Canadian Mining Institute.

Mr. R. H. Coates, Controller of the Census, addressed the Toronto branch of the Canadian Mining Institute on Saturday Jan. 20.

Mr. J. S. McLeish of the Mines Branch, Ottawa, addressed a meeting of the Royal Canadian Institute in Toronto on Saturday, Jan. 27.

Hon. T. W. Crothers, Minister of Labor, has left Ottawa for Fernie to endeavor to settle the coal miners' strike. He is accompanied by Mr. R. F. Green, M. P. for Kootenay.

Mr. Robert Bryce wishes to state that he has resigned as consulting engineer of the Cheney Copper Co. Ltd.

Mr. W. J. Barker, of Nelson, for several years in charge of the Arlington gold mine, in Erie camp, Nelson mining division, British Columbia, who last year went to Montana, recently returned to Nelson and is now at the Yankee Girl mine, near Ymir, south of Nelson.

Mr. John F. Miller, of Trail, B. C., superintendent of the Consolidated Mining and Smelting Co's electrolytic refineries, has resigned, after about eighteen years continuous services at the Trail works.

Mr. E. Jacobs, of Victoria, B. C., secretary of the Western Branch of the Canadian Mining Institute, was one of several invited speakers at the "Open House" and smoker arranged by the College of Mines of the University of Washington, Seattle, Washington, in connection with the recent opening on the University campus by the United States Bureau of Mines of a mining and metallurgical experiment station. The staff of the station thus far appointed consists of Dr. Dorsey A. Lyon, superintendent; Mr. U. B. White, chief clerk, and Mr. Geo. Watkin Evans, coal mining engineer. An electro-metallurgical engineer is yet to be appointed. The work of this station will be restricted chiefly to experimental and economic problems with a view to the elimination of waste and utilization of by-products from minerals. The work of the Bureau's mine rescue station, established at the university six years ago. will be continued, this including training of university students and miners in mine-rescue and first-aid work. with Mr. J. J. Corey in charge.

Two well known officials of the Consolidated Mining and Smelting Co. have recently been bereaved. About the end of December Mr. M. E. Purcell, of Rossland B. C., superintendent of the company's Centre Star-War Eagle group of mines, lost his mother who died at Rossland at an advanced age. On January 14, the wife of Mr. S. G. Blaylock, the company's assistant general manager, died quite unexpectedly at Trail. Both mourners have the earnest sympathy of a wide circle of friends among the mining community of British Columbia.

Mr. Bruce White, of Sandon, Slocan, manager of the Noonday Mines Co., who went to Skowhegan, Maine, to spend Christmas and New Year with his family there, expects to return to British Columbia about the middle of February

Mr. Chas. Graham, for several years superintendent for the Corbin Coal and Coke Co., with coal mines at Corbin, Crowsnest district of British Columbia, has resigned to accept the position of superintendent of the Crow's Nest Pass Coal Co's Michel colliery, also in Southeast Kootenay.

Mr. John Hopp, the well-known hydraulic placer-gold mining operator, for years actively engaged in mining in Cariboo district of British Columbia, was called to Spokane, Washington, the first week in the New Year to attend the funeral of a married sister who had died in that city.

Mr. R. C. Hargrave, of the Consolidated Mining and Smelting Co's laboratory staff, left Trail, B. C., recently to accept a commission in the Royal Engineers for war service in Europe.

Mr. W. A. Wylie, mine superintendent for the Britannia Mining and Smelting Co., operating the big copper mine near Howe sound, in Vancouver mining division of British Columbia, has gone to San Francisco, to spend a holiday there after four years of strenuous work. It is stated that the company has not accepted his resignation, but he may not return to the Britannia mine. The "Daily Province" quotes Mr. Wylie as having said, when in Vancouver on his way to California: "The Britannia is such a busy place that the only way one can get a holiday is simply to quit. There has been a shortage of power for some time, owing to the lack of water in the creeks supplying the generating plant, but the recent heavy rains should correct that. There has been a great improvement throughout the property and plant during the last year, a very large amount of work having been done both at the upper and the halfway sections of the mine plant. Development work is also being carried on at some of the more distant parts of the property, which in due course will also be brought into production. With the price of copper as high as it is, continued activity may be expected. Mr. Wylie was the recipient of several gifts from the mine employees before he left, these including a handsome gold watch with nugget chain and locket, and a solid silver cigar case and match case.

Mr. Sidney J. Jennings and Mr. Philip V. Moore are candidates for the presidency of the American Institute of Mining Engineers.

Mr. E. P. Mathewson, Toronto, general manager of the British America Nickel Corporation, has been awarded the coveted gold medal of the Metallurgical Society of America for his achievements in metallurgy during the past year. The medal is awarded annually to the member performing the most valuable service in the interest of the development of American mineral resources.

Mr. Hamlin Brooks Hatch, formerly of the Engineering staff of the Dome Mines, has been appointed engineer in charge of mining operations on the Tommy Burns Porcupine properties.

Mr. H. Darling, formerly Engineer at the Porcupine Crown, is now manager at the Dome Lake.

Mr. C. H. Manaton, Toronto, has been elected an associate member of the Canadian Mining Institute.

Mr. S. F. Kirkpatrick, Professor of Metallurgy, Queens University, has been appointed a member of the Honorary Advisory Council on Industrial and Scientific Research.

Mr. J. B. Tyrrell has left Toronto to visit one of the mining properties in the Rice Lake gold district in eastern Manitoba.

SPECIAL CORRESPONDENCE

COBALT AND PORCUPINE

Vipond-North Thompson.

The ore being treated at the Vipond mill in Porcupine since the merger of the Vipond and North Thompson is practically all coming from the North Thompson property and the mill heads are expected to be considerably higher than for some time past. A crosscut is being driven at the 600 ft. level to connect the two properties.

Porcupine Milling Capacity.

Milling capacity of the Porcupine mines during 1916 has increased approximately 1,065 tons per day, and at the commencement of 1917 the daily milling capacity of the camp is estimated at 4,263 tons. The anticipated increase during the year 1917 will greatly surpass this figure, and it looks as if the gold mining industry in the north country was at last coming into its own.

New Gold Discoveries.

New discoveries of gold in the townships of Cairo, Powell and Kimberley have caused quite an influx of prospectors to the district, which is located some twenty-two miles from Elk Lake, near Fort Matachewan, on the Montreal river. The specimens brought to Haileybury are not spectacular, but the gold seems to be distributed very evenly through the quartz and the values are said to run very high.

Lake Shore.

During the past year the Lake Shore Mining Co. at Kirkland Lake have done some aggressive development work, with the result that they now have a shaft sunk to the 300 ft. level and have accomplished 600 ft. of drifting, 160 ft. of crosscutting and 16 ft. of raising at this level. At the 100 ft. level over 100 ft. of drifting has been done. A large percentage of the workings are said to be in excellent ore and it is estimated that already over $300,000 worth of ore is blocked out. A ball mill with a capacity of from 60 to 100 tons daily has been ordered for the Lake Shore, and the work of installation will shortly begin.

Murray-Mogridge.

At Bourke's Siding on the T. & N. O. Railway, a new company, known as the Murray-Mogridge, has started to develop a 400 acre property, which is located three miles from the main line of the railway, near Wolfe Lake. To date development work has been confined almost entirely to sinking on one vein, which has been traced for a distance of 2,000 feet. A shaft 50 ft. in depth has been sunk at each end of this vein, with very gratifying results. A force of men has been engaged on the property for the past three months, and will be considerably augmented in the near future as the company have outlined an extensive plan for the development of the property.

In Deloro.

Porcupine Premier, Maidens-McDonald and the Anchorite, the latter two under option to the La Rose and Coniagas of Cobalt, respectively, are located in Deloro township, and all are meeting with excellent results at depth. The Porcupine Premier is sinking to the 300 ft. level to prove the ore bodies existing at the 100 ft. level.

Hunton-Kirkland.

The Hunton-Kirkland Co. has ordered an electric compressor, hoists and other equipment which it is expected will be installed some time in February. This Kirkland Lake property, which has passed into the control of New York interests, will now be given a chance to prove its merits. Work on the erection of camp and plant buildings is to be commenced at once.

National.

Test runs of the oil flotation process were made last week at the plant recently installed at the National mines, Cobalt, where the company purpose treating the tailings impounded from the King Edward mine, which is now known as the National mines. These tailings are said to contain about seven oz. of silver to the ton, and it is estimated that there are forty thousand tons available for treatment.

Boston Creek.

The Crown Reserve Mining Co. of Cobalt has again entered the Boston Creek district and have optioned the O'Donald group of claims lying between the R. A. P. Syndicate and the Boston Hollinger. The option price is said to be a large one. A staff of men have already commenced surface work and the erection of camp buildings is proceeding. The company have outlined an extensive plan of development. The main veins of the Boston-Hollinger, the R. A. P. Syndicate and Boston Creek mines are said to cross these claims.

Hayden.

The Hayden, which lies about three miles south of Timmins, is now being developed at the 300 ft. level. Orebodies which consist of three veins each with an average width of nine feet, have been found to continue to depth with remarkable consistency.

Pittsburg-Lorrain.

About thirty men are now employed at the Pittsburg-Lorrain property in South Lorrain. Some high grade ore has been encountered at the 300 ft. level.

Hargraves.

At the 375 ft. level of the Hargraves some rich ore has been encountered. The vein at this point is from six to eight inches in width, and carries an average silver content of around 2,000 oz. to the ton. A winze is being sunk on this ore shoot, and the bagging of high grade ore commenced. Three machines will be kept running.

Schumacher.

The crosscut at the 200 ft. level of the No. 4 shaft of the Schumacher, which was sunk between two vein outcroppings, has cut the south vein at a point 60 ft. south of the shaft. Up to the present the vein has been cut to a depth of 17 ft. with the face of the crosscut still in ore.

Dome Lake.

Delay in the receipt of parts has delayed the opening of the Dome Lake mill. However, the cyanide end is now being tried out, and in a very short time everything should be going at full capacity.

McIntyre.

The McIntyre-Porcupine is now producing over $5,000 per day. The average grade of ore is nearly $11 to the ton, and when the mill is brought to its full capacity of 600 tons daily the costs will probably be reduced to $4 per ton, leaving a profit of $7 a ton on every ton milled. The company's earnings should then amount to $4,200 per day, or a profit of $1,533,000 on the $3,610,288 issued capitalization.

BRITISH COLUMBIA

The year has opened with much confidence felt relative to the progress that will be made in mining in 1917. The delay that has taken place in settlement of the differences between the coal mine employees and operators in the Crowsnest district of British Columbia and the neighboring coal mining territory in Alberta is not reassuring, but it is still hoped there will be an amicable understanding arrived at, so that there will not be any further restriction of the supply of coke for the blast furnaces of the smelting works in West Kootenay and Boundary districts. Shipment of ore from the Consolidated Co.'s mines in Rossland camp has been resumed after a suspension of production of only two weeks. On the other hand, for some unannounced reason, no ore at all was received at Trail from Slocan mines during the first week in January, but this may have been due to transportation difficulties, although this is only a surmise. It is to be expected that for several weeks winter conditions will interfere somewhat with the movement of ore from mines in districts where the snowfall is heavy and the trails and roads consequently at times unsuitable for heavy hauling to be done over them.

EAST KOOTENAY.

The concentrating plant at the St. Eugene mines, Moyie, Fort Steele mining division, is again in operation, work having been resumed early in January. Some additions were made to the machinery late in 1916. The works had been idle for about five years. Mr. A. G. Monkhouse, formerly in charge of Consolidated Mining and Smelting Co.'s Highland concentrator, near Ainsworth, Kootenay lake, West Kootenay district, is superintendent at the St. Eugene. Part of the mine is being worked by a leasing syndicate of miners.

The Lead Queen, in Windermere division, resumed shipping ore to Trail late in the year, though not in large quantity, the long wagon haul to the railway at Brisco preventing shipment of any considerable tonnage. The Paradise, in the same division, continues to ship, receipts at Trail from this mine during the first week in January having been 86 tons. There is talk of putting a concentrating plant on the Victor, in Fort Steele division, but as there seem to have been given publicity recently, some much inflated statements concerning quantity of ore on this property, reports as to what will be done in the near future may well be received with caution.

WEST KOOTENAY.

Ainsworth.—The Bluebell and Comfort lead mines, on the east side of Kootenay lake, and the Highland, on the west side, continue to be the chief shippers of ore from this division, though the Bluebell was not on the list for the first week in 1917. The Silver Hill, near Crawford bay, also on the east side of the lake, sent a small lot of ore to Trail lately, this being the first ore sent from this property in recent years. The concentrating mill of the Florence Mining Co. is not yet completed, but it is expected that construction and equipment will soon be finished and a start be made to concentrate ore, of which there has been much opened underground in the company's mine within a mile of the lake. Provision has been made for generating power on one of the branches of Woodbury creek, an aerial tramway has been constructed between mine and concentrating mill, and generally progress has been made toward production on a fairly large scale, as compared with other mines in Ainsworth camp. From Kaslo has come the news that the mill is expected to be in operation before the close of January.

Slocan,—The Kaslo "Kootenaian" has published the following relative to the Van-Roi Mining Co.'s property, situated in the neighborhood of Four-mile creek, and distant about five miles from Silverton on Slocan lake: "A deal of considerable importance has been closed by which Mr. Clarence Cunningham of Sandon, has taken a lease and bond on the Van-Roi group, near Silverton, which previous to the War was worked by a subsidiary company of the Le Roi No. 2, Ltd., of Rossland, operating under the name of the Van-Roi Mining Co. Mr. Cunningham was in New York at the time the deal was closed, and it is possible he may have interested Eastern capital in the project. At any rate it is learned from an outside source that one of the terms of the lease is that the sum of $50,000 must be spent in development work.

"The work at the Van-Roi is to be in charge of Mr. F. Cushing Moore, late of Wallace, Idaho, who is a mining engineer of long experience, and from whom big things are expected in rehabilitating the mine. He left Sandon on January 6 for the mine to get things moving underground. Some outside work has already been accomplished. It is intended first of all to extend drifts Nos. 7 and 9.

"Previous to the outbreak of the War, at which time the mine was closed, the Van-Roi produced a considerable quantity of ore, and at one time there were as many as 80 men on its payroll. By the time, however, that war was declared, the development of the Van-Roi has fallen behind, so that when the prices of metals fell it was not possible to continue operations. The property is unusually well equipped, having a 100 ton concentrating mill, good water-power, compressor, buildings, etc.

"Mr. Cunningham, who is operating the Wonderful, the Slocan Sovereign and the Queen Bess, appears to be very lucky in all of his undertakings in the Sandon part of Slocan district, he having turned three 'dead ones' into ore shippers in a short time. If his good fortune continue in respect to the Van Roi, he may succeed in adding fresh laurels to the splendid mineral production record of mines near Silverton."

It may be added that Mr. Cunningham also a short time ago bonded the Idaho-Alamo group of mines, situated at the head of Howson creek, which flows into Carpenter creek a mile or two below Three Forks. It is probable his so-called "luck" is rather the result of intelligent and persistent work in operating mines.

COAST DISTRICT.

A quantity of copper ore, stated to be about 400 tons, but probably a smaller quantity, was a few weeks ago shipped from the Indian Chief mine, on Sidney inlet, west coast of Vancouver island, to the smelting works at Tacoma, Puget sound, Washington. The average copper content of this ore is given as having been rather less than five per cent. The mine has been worked, with somewhat long intervals of inactivity, by several different syndicates or companies, but heretofore without long-continued profitable results.

Messrs. Jones & Rant, a Victoria firm of contractors, have entered into an agreement with the Valdes Copper Co. of Victoria, to do development work on that company's group of claims on Quadra and Steep islands of the Valdes group of islands lying between the Mainland of British Columbia and Vancouver island, on the east side of Discovery passage, which is the route of

most of the steamers trading on the coast. The company owns ten claims, known as the Copper Mountain group, situated on Quadra island, and one claim, the Bluebird, on Steep island. In a report by Mr. J. W. Astley, M.E., printed in the 1914 Annual Report of the Minister of Mines for British Columbia, these properties are described in some detail, and the following general informaion is also given:

"The formation in which the ore is found is a series of flat-lying ashbeds or flows, with a slight dip generally to the south or southeast. These beds or layers vary in texture from a porous amygdaloidal structure to a fine-grained compact rock. It is in this formation that the ore occurs along zones of shearing or faulting.

"The development has been mostly carried on in the crushed or brecciated areas on either side of these zones of weakness. It is chiefly in the more porous beds or layers, when outcropping on the surface, that the development work has been done. This superficial development discloses large irregular areas of copper-stained and copper-bearing rock.

"The mineralization, mostly as chalcocite, is disseminated in small particles through the rock, varying in quantity according to the porous nature, or otherwise, of the different beds or layers, and in a more concentrated form as replacement filling of amygdaloidal cavities of the more porous beds.

"The copper occurs chiefly as chalcocite, but azurite, malachite and the red and black oxides of copper are also present, and this is more noticeable at or near the surface. Chalcopyrite only occurs in very small quantity.

"All the development work done is superficial. Shallow cuts and openings have disclosed large irregular areas of copper-stained and copper-bearing rock and ore on the surface, but very little depth has been attained. The deepest cut is only 16 ft., and most of the openings have only penetrated the surface two or three feet. For this reason nothing can be said with any degree of certainty as to how the mineralization will hold out at depth. Whether it will be more or less continuous in the vicinity of the crushed zones, or if it will be confined to certain beds or layers, remains to be proved, by deeper development. Many of the showings warrant a system of vigorous development."

It may be added that since Mr. Astley reported on the property it has been examined for United States capitalists by Mr. J. L. Bruce of Butte, Montana, and two or three other well known engineers from the United States, but although the showings were considered to be very promising, there was altogether too little development work done to induce the taking of it over by men who were looking for developed mines, not for prospects.

GENERAL NOTES.

A carload of silver-lead ore from the Ethel mine, in Trout Lake mining division of West Kootenay, was shipped early in January by steamer from Trout Lake city to Gerrard, and thence by railway and steamer to Trail.

A correspondent of the Nelson "Daily News" states that Andy Daney of Trout Lake city and six associates of Camborne and Beaton, have leased the Beatrice silver-lead mine, H. Y. Anderson and Dr. W. H. Willson having discontinued working it. The mine is situated in Lardeau mining division, in the mountains above Camborne, and some years ago a considerable quantity of ore was shipped from it. The lessees intend to do work on the property throughout the winter.

Ore receipts at the Consolidated Mining and Smelting Co.'s smelting works at Trail during the first week of 1917 were comparatively small, the total having been only 5,695 tons. The several districts and mining divisions from which the ore came were as follows: East Kootenay, 1,840 tons; West Kootenay, Ainsworth, 230 tons; Nelson, 116 tons; Trail Creek (Rossland), 1,883 tons; Boundary, 116 tons; Yale; Nicola, 83 tons; Kamloops, 86 tons; Omineca division, 34 tons; United States, 783 tons. Of the total, 4,234 tons was from mines operated by the Consolidated Co., and 1,461 tons was of custom ore. The shipments from the company's mine were: Centre Star and Le Roi, Rossland, 1,704 tons; Sullivan, East Kootenay, 1,684 tons, and St. Eugene 36 tons; Highland, Ainsworth, 170 tons; Emma, Boundary, 640 tons.

MacKINNON, HOLMES & CO.

Changes in the management of MacKinnon, Holmes & Co., Limited, of Sherbrooke, Que., have recently taken place, caused by the retirement from the company of Mr. A. R. Holmes, who in the past has occupied the position of director and secretary-treasurer.

It is understood that Mr. J. W. Bowman, president, and Mr. G. D. MacKinnon, vice-president and general manager, have purchased the holdings of Mr. A. R. Holmes and his friends, and new directors, in the person of Dr. A. W. Klein of Greenwich, Conn., M. L. MacKinnon and J. Nicol of Sherbrooke, Que., have been elected with Mr. F. C. Johnston, secretary-treasurer.

The business will be conducted as in the past, under the management of Mr. G. D. MacKinnon, and it is understood the company is making extensive plans for future development.

This company has been particularly successful in its general business of structural steel and steel plate work, having one of the most complete plants in the country for these special lines. It has also been successful in the forging of shells for the Imperial Munitions Board, having a very complete and up-to-date plant for this special work.

NOVA SCOTIA STEEL.

Boston, Jan. 23.—About the only large sized fly in the Nova Scotia Steel ointment is the question of the size of the British war tax. Based upon the assumption that 25 per cent. will satisfy this tax in 1916, it seems practically assured that during its fiscal year to December 31 last, Nova Scotia Steel earned better than $40 per share on its $7,500 000 common stock. This is after all interest and prior obligation charges. It is a smaller balance than seemed likely four or five months ago, but it compares most favorably with the 20 per cent. earned in 1915.

So far as 1917 operations are concerned the company would seem to be about as well guaranteed as a manufacturing corporation can well be.

Its entire productive capacity for 1917 is sold ahead. If more orders are taken it will be on the hypothesis that mill additions nearing completion or in middle process of completion will be productive in time to make the taking of these orders feasible.

It has been rumored that Nova Scotia Steel directors might do something at an early date in the direction of common dividends. While the matter is not definitely settled, nothing was done at the directors' meeting early this month and there are strong interests in

the property who feel that the present is not the time to undertake common dividends.

Orders at more than 100 per cent. capacity and inventories 100 per cent. greater than normal mean large working capital and this can be better obtained by utilizing surplus earnings than by borrowing from the banks.

Nova Scotia Steel will have one new 2,700 ton steamship in commission in April and a second of the same size should follow shortly after that.

PHYSICAL PROPERTIES OF MOLYBDENUM.

Pure molybdenum is a white metal. Its appearance depends largely on the method of production. If obtained by reducing the oxides or the sulphides of molybdenum by hydrogen, it is a gray powder which under heat and pressure may be compacted into a metallic bar that is brittle and even fragile. Produced by aluminothermic methods or by reduction in the electric furnace, it is a compact metal, but owing to the absorption of carbon in the electric furnace, it is not pure and has different physical properties from the carbon-free metal, as is explained later. Pure compact molybdenum is malleable and is sufficiently soft to be filed and polished with ease. It will not scratch glass.

Molybdenum produced by the reduction of molybdic oxide with carbon in an electric furnace does not possess the same physical properties as pure molybdenum, owing to its absorption of carbon. Metal obtained by this method is gray and brittle. It is also very hard and scratches steel and quartz; even the hardest file will not cut it when it contains a certain proportion of carbon. The melting point of the gray metal is much below that of pure molybdenum, and its specific gravity is also lower, ranging from 8.6 to 8.9, depending on the amount of carbon present. When pure molybdenum is surrounded with carbon and heated to about 1,500 degrees C., it absorbs carbon and becomes hard. Inversely, if carbon-bearing molybdenum is melted with molybdenum dioxide, the carbon in the metal is oxidized and the molybdenum is refined and takes on the physical properties of the pure metal.

MOLYBDENITE.

Molybdenite is the disulphide of molybdenum (MoS_2) and contains 59.95 per cent. of molybdenum and 40.05 per cent. of sulphur. It is a soft, opaque, lead-gray mineral with a metallic luster and greasy feel. It commonly occurs in flakes or scales having a prominent basal cleavage, and resembling some micas in the way the flakes may be split into thin leaves. Finely granular and massive forms are also common. The mineral is sectile and in the flaky form the laminae are flexible but not elastic. In hardness it ranges from 1 to 1.5, being so soft that it soils the fingers readily in handling and marks paper, on which it leaves a bluish-gray trace. On porcelain its streak is slightly greenish. Its specific gravity has been variously determined at 4.7 to 4.8 degrees.

On account of many similar characteristics molybdenite is often confused with graphite, but it may be easily distinguished from the latter as graphite has a much lower specific gravity, 2.09 to 2.23, and its streak is lead-gray on both paper and porcelain. Heating a fragment of the mineral in a closed tube will conclusively settle any further question as to its identity, as the strong sulphurous odor given off by molybdenite is entirely lacking with graphite.

The award of the gold medal of the Metallurgical Society of America to Mr. E. P. Mathewson is an acknowledgment of the work he has done in metallurgy in the United States. Mr. Mathewson has gained an enviable international reputation and it affords pleasure to his friends to see his services thus recognized. Anaconda and Mathewson have been synonymous with success in the copper world. We can only wish for Mr. Mathewson and the company he is now connected with that his name will become linked in the same way with British-American nickel.

TORONTO MARKETS.

Cobalt oxide, black, $1.05 per lb.
Cobalt oxide, grey, $1.15 per lb.
Cobalt metal, $1.25 to $1.50 per lb.
Cobalt anodes, $1.50 to $1.75 per lb.
Nickel metal, 45 to 50 cents per lb.
White arsenic, 5½ to 6 cents per lb.

Jan. 24, 1917—(Quotations from Canada Metal Co., Toronto)—
Spelter, 13½ cents per lb.
Lead, 9½ cents per lb.
Tin, 48 cents per lb.
Antimony, 18 cents per lb.
Copper, casting, 35½ cents per lb.
Electrolytic, 36 cents per lb.
Ingot brass, yellow, 22 cents; red, 24 cents per lb.

Jan. 24—(Quotations from Elias Rogers Co., Toronto)—
Coal, anthracite, $9.50 per ton.
Coal, bituminous, nominal, $10 to $14 per ton.

SILVER PRICES.

		New York, cents.	London, pence.
January	6	75⅜	36½
"	8	75¼	36⅜
"	9	75	36¼
"	10	75	36¼
"	11	74⅝	36⅛
"	12	74⅜	36
"	13	74⅜	36
"	15	74⅜	36
"	16	74¼	36
"	17	75	36⅜
"	18	75⅜	36⅝
"	19	75⅞	36⅞

MOLYBDENITE PRICES.

Schedule of prices per unit (20 lbs.) of Molybdenite in ore delivered at concentrator, Renfrew.

Ores carrying between 2% and 3% MoS_2, $14.00 per unit.
Ores carrying between 3% and 5% MoS_2, $16.00 per unit.
Ores carrying between 5% and 10% MoS_2, $17.50 per unit.
Ores carrying between 10% and 15% MoS_2, $18.50 per unit.
Ores carrying between 15% and 20% MoS_2, $19.50 per unit.

80% concentrates, $1.09 per lb. of MoS_2.
Penalties imposed for copper and bismuth.
No settlement made for any molybdic oxide in ores.
Settlement ten days after sampling.
Samples of ores to be submitted before any shipment made.

MARKETS

NEW YORK MARKETS.

Connellsville Coke—
Furnace, spot, $10.00.
Furnace, contract, $6.00 to $8.50.
Foundry, prompt, $10.00 to $11.00.
Foundry, contract, $8.00 to $8.50.
Straits Tin, f.o.b. nominal, 45.50 cents.
Copper—
Prime Lake, nominal, 29.50 to 30.50 cents.
Electrolytic, nominal, 30.50 to 31.50 cents.
Casting, nominal, 28.25 to 28.75 cents.
Lead, Trust price, 7.50 cents.
Lead, outside, nominal, 7.75 cents.
Spelter, prompt western shipment, 9.92½ to 10.00 cents.
Antimony—Chinese and Japanese, nominal, 15 cents.
Aluminum—nominal—
No. 1 Virgin, 98-99 per cent., 56.00 to 60.00 cents.
Pure, 98-99 per cent. remelt, 50.00 to 54.00 cents.
No. 12 alloy remelt, 36.00 to 40.00 cents.
Powdered aluminum, 85.00 to 90.00 cents.
Metallic magnesium—99 per cent. plus, $3.00 to $3.50.
Nickel—shot and ingot, 45.00 cents.
Electrolytic, 50.00 cents.
Cadmium, nominal, $1.45 to $1.50.
Quicksilver, $80.00.
Platinum—
Pure, $90.00.
10 per cent., $95.00 to $96.00.
Cobalt (metallic), $1.50.
Tungsten ore per unit, $17.00 to $17.50.
Silver (official), 75⅞ cents.

Metal Products—Following quotations represent mill prices and are strictly nominal except in the case of lead sheets and sheet zinc:

Sheet Copper—
Hot rolled, 42.00 cents.
Cold rolled, 43.00 cents.
Copper bottoms, 50.00 cents.
Copper in rods (round), 41.00 cents.
Square and rectangular, 42.00 cents.
Copper wire, nominal, 38.00 to 39.00 cents.
Copper wire, April-May, 33.50 cents.
High brass—
Sheets, 39.00 to 40.00 cents.
Wire and light rods, 40.00 cents.
Heavy rods, 38.00 to 39.00 cents.
Low Brass—sheet wire and rods, 42.00 cents.
Tubing—
Brazed bronze, 51.00 to 52.00 cents.
Brazed brass, 48.00 to 49.00 cents.
Seamless copper, 45.00 to 46.00 cents.
Seamless brass, 43.00 to 45.00 cents.
Seamless bronze, 52.00 cents.
Full lead sheets, 9.25 cents.
Cut lead sheets, 9.50 cents.
Sheet zinc, f.o.b. smelter, 21.00 cents.

STOCK QUOTATIONS.

(By courtesy of J. P. Bickell & Co., Toronto.)

As of close January 24th, 1917.

New York Curb.

	Bid.	Asked.
Aetna Explosives	3.37	3.65
Boston & Montana	75.00	77.00
Butte Copper and Zinc	10.75	11.00
Howe Sound	7.25	7.75
Standard Silver and Lead	.56	.68
Allis-Chalmers	.28	.28½
Anaconda	.84	.84⅛
Granby	.89¾	.90
International Nickel	.42⅜	.42½
Westinghouse	.53¼	.53½

Porcupine Stocks.

	Bid.	Asked.
Apex	.10¾	.11½
Davidson	.68	.70
Dome Consolidated	.08	...
Dome Extension	.27¼	.27½
Dome Lake	.50	.51
Dome Mines	21.50	...
Foley O'Brien	.70	...
Gold Reef	.03⅞	.04
Hollinger Cons.	6.75	6.80
Inspiration	.18	.18½
Jupiter	.32	.33
McIntyre	1.96	1.97
McIntyre Extension	.59	.60
Moneta	.15¼	.15½
Newray	1.40	1.41
Porcupine Crown	.72½	.75
Porcupine Gold	.01½	.01¾
Porcupine Imperial	.04⅝	.05
Porcupine Tisdale	.04	.04⅛
Porcupine Bonanza	...	.10
Vipond	...	.45
Preston East Dome	.06⅜	.06½
Schumacher	.65	.69
Teck Hughes	.75	...
West Dome	.30¼	.30½
Boston Creek	1.33	1.34
Kirkland Lake	.45	.48
Ken. Silver	.24½	.29
Vacuum Gas and Oil	.30	.40

Cobalt Stocks.

	Bid.	Asked.
Adanac	.15	.25
Bailey	.05	.06½
Beaver Consolidated	.36½	.38
Buffalo	1.50	1.75
Chambers Ferland	.15	.15¼
Coniagas	...	4.55
Crown Reserve	...	.43
Foster	.03⅞	...
Gifford	.04½	.04⅞
Gould	.00¼	.00⅜
Great Northern	.13¼	.13½
Hargraves	.15½	.15¾
Hudson Bay	...	.70
Kerr Lake	4.55	4.75
La Rose	.53	...
Lorrain Con.	.40	.41
McKinley Darragh Savage	.50	.52
Nipissing	8.20	8.40
Ophir	.09½	.09¾
Peterson Lake	.11¾	.12
Right of Way	.05¼	.05½
Seneca Superior	.02½	.02¾
Silver Leaf	.02⅛	.02¼
Shamrock Cons.	.20½	.21
Temiskaming	.59½	.60

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Hull Iron & Steel Foundries, Ltd.

Kominuters—
Hull Iron & Steel Foundries, Ltd.

Lamps—Safety—
Canadian Explosives.

Link Belt—
Northern Canada Supply Co.
Jones & Glassco.

Locomotives—
W. Fraser.

Machinists and Founders—
Hull Iron & Steel Foundries, Ltd.

Metal Merchants—
Henry Bath & Son.
Geo. G. Blackwell, Sons & Co.
Consolidated Mining and Smelting Co. of Canada.
Canada Metal Co.
C. L. Constant Co.

Monel Metal—
International Nickel Co.

Nickel—
International Nickel Co.

Ore Sacks—
Northern Canada Supply Co

Ore Testing Works
Ledoux & Co.
Can. Laboratories.
Milton Hersey Co., Ltd.
Campbell & Deyell.

Ores and Metals—Buyers and Sellers of—
C. L. Constant Co.
Geo. G. Blackwell.
Consolidated Mining and Smelting Co. of Canada.
Orford Copper Co.
Canada Metal Co.

Perforated Metals—
B. Greening Wire Co., Ltd.
Fraser & Chalmers of Canada, Limited
Northern Canada Supply Co.
Hendrick Mfg. Co.

Pig Tin—
Canada Metal Co., Ltd

Pig Lead—
Canada Metal Co., Ltd.

Pipes—
Canada Metal Co., Ltd.
Consolidated M. & S. Co.
Pacific Coast Pipe Co., Ltd.
Northern Canada Supply Co.
Smart-Turner Machine Co.

Pipe Fittings—
Northern Canada Supply Co.

Piston Rock Drills—
Mussens, Limited.

Pneumatic Tools—
Can. Ingersoll-Rand Co., Ltd
Jones & Glassco.

Prospecting Mills and Machinery—
Standard Diamond Drill Co.
Fraser & Chalmers of Canada, Limited

Canadian Miners' Buying Directory.—(Continued from page 14.)

Pulleys, Shafting and Hangings—
Fraser & Chalmers of Canada, Limited
Jeffrey Mfg. Co.
Northern Canada Supply Co.

Pumps—Boiler Feed—
Darling Bros., Ltd.
Smart-Turner Machine Co.
Northern Canada Supply Co.
Canadian Ingersoll-Rand Co. Ltd.
Fraser & Chalmers of Canada, Limited

Pumps—Centrifugal—
Darling Bros., Ltd.
Escher Wyss & Co.
Mussens, Limited.
Smart-Turner Machine Co.
M. Beatty & Sons.
Can. Ingersoll-Rand Co., Ltd
Fraser & Chalmers of Canada, Limited

Pumps—Electric—
Darling Bros., Ltd.
Smart-Turner Machine Co.
Canadian Ingersoll Rand Co., Ltd.
Fraser & Chalmers of Canada, Limited

Pumps—Pneumatic—
Darling Bros., Ltd.
Smart-Turner Machine Co.
Can. Ingersoll-Rand Co., Ltd
Sullivan Machinery Co.

Pumps—Steam—
Can. Ingersoll-Rand Co., Ltd
Darling Bros., Ltd.
Mussens, Limited.
Northern Canada Supply Co.
Smart-Turner Machine Co.

Pumps—Turbine—
Darling Bros., Ltd.
Smart-Turner Machine Co.
Canadian Ingersoll-Rand Co., Ltd.
Fraser & Chalmers of Canada, Limited

Pumps—Vacuum—
Darling Bros., Ltd.
Smart-Turner Machine Co.

Quarrying Machinery—
Sullivan Machinery Co.
Can. Ingersoll-Rand Co., Ltd.

Rails—
W. Fraser.

Roasting Plants—
Fraser & Chalmers of Canada, Limited

Rolls—Crushing—
Fraser & Chalmers of Canada, Limited

Roofing—
Northern Canada Supply Co.

Rope—Manilla and Jute—
Jones & Glassco.
Northern Canada Supply Co.
Allan, Whyte & Co.

Rope—Wire—
B. Greening Wire Co., Ltd.
Allan, Whyte & Co.
Northern Canada Supply Co.
Fraser & Chalmers of Canada, Limited

Samplers—
C. L. Constant Co.
Ledoux & Co.
Milton Hersey Co.
Thos. Heys & Son.

Screens—
B. Greening Wire Co., Ltd.
Jeffrey Mfg. Co.
Northern Canada Supply Co.
Fraser & Chalmers of Canada, Limited
Roberts & Schaefer Co.

Screens—Cross Patent Flanged Lip—
Hendrick Mfg Co.

Separators—
Darling Bros., Ltd.
Smart-Turner Machine Co.

Sheet Lead—
Canada Metal Co., Ltd.

Sheets—Genuine Manganese Bronze—
Hendrick Mfg. Co.

Shovels—Steam—
M. Beatty & Sons.
W. Fraser.

Smelting Machinery—
Fraser & Chalmers of Canada, Limited

Stacks—Smoke Stacks—
Hendrick Mfg. Co.

Stamp Mills—
Fraser & Chalmers of Canada, Limited

Steel Barrels—
Smart-Turner Machine Co.

Steel Drills—
Sullivan Machinery Co.
Northern Canada Supply Co.
Can. Ingersoll-Rand Co., Ltd

Steel Drums—
Smart-Turner Machine Co.

Steel—Tool—
N. S. Steel & Coal Co.
Armstrong, Whitworth of Can., Ltd.

Surveying Instruments—
W. F. Stanley.
C. L. Berger.

Tanks—Cyanide, Etc.—
Fraser & Chalmers of Canada, Limited
Hendrick Mfg. Co.
Pacific Coast Pipe Co., Ltd.

Tipples—
Roberts & Schaefer Co.

Transits—
C. L. Berger & Sons.

Tube Mills—
Fraser & Chalmers of Canada, Limited

Turbines—
Escher Wyss & Co.
Fraser & Chalmers of Canada, Limited

Winding Engines—
Canadian Ingersoll-Rand Co., Ltd.

Wire Cloth—
Northern Canada Supply Co.
B. Greening Wire Co., Ltd.

Wire (Bare and Insulated)—
Standard Underground Cable Co., of Canada, Ltd.

Zinc Spelter—
Canada Metal Co., Ltd.

ALPHABETICAL INDEX TO ADVERTISERS

A

Allan, Whyte & Co. 2
American Zinc Lead & Smelting Co. 5
Armstrong, Whitworth of Can., Ltd. 10

B

Bath, Henry & Son 13
Balback Smelting & Refining Co. 13
Beatty, Blackstock, Fasken, Cowan & Chadwick 12
Beatty, M. & Sons 9
Berger, C. L. & Sons 9
Blackwell, Geo. G., Sons & Co... 13
British Columbia, Province of.... 7
Buffalo Mines, Ltd. 4

C

Campbell & Deyell, Ltd. 11
Canadian Copper Co. 6
Canadian Explosives, Ltd. 14
Can. Ingersoll-Rand Co., Ltd. 1
Canadian Inspection & Testing Laboratories, Ltd. 11
Canadian Laboratories, Ltd. 11
Canada Metal Co. 12
Cohen, S. W. 11
Consolidated Mining & Smelting Co. 13
Coniagas Reduction Co., Ltd. ... 13
Constant, C. L. & Co. 13
Curtis's & Harvey ..... Outside Back Cover

D

Darling Bros. 9
Dept. of Mines, Canada ..... Inside Front Cover
Deloro Mining & Reduction Co.. 13
Diamond Drill Contracting Co. .. 4
Dominion Coal Co., Ltd. 9
Dominion of Canada Debenture Stock. 3
Dominion Engineering & Inspection Co. 11
Dorr Co. 11
Dwight & Lloyd Sintering Co., Inc. 7

E

Escher, Wyss & Co. 4

F

Ferrier, W. F. 11
Fleck, Alex. 9
Forbes, D. L. H. 11
Fraser & Chalmers 4
Fuller, A. S. & Co. 12

G

Gartshore Jno. 4

H

Hassan, A. A. 11
Hendrick Mfg. Co. 6
Hersey, Milton Co., Ltd. 11
Heys, Thomas & Son 11
Hitchcock, C. H. 11
Hull Iron & Steel Foundries, Ltd. ..... outside front cover

I

Imperial Bank of Canada 6
Industrial & Technical Press 2
International Molybdenum Co. .. 6
International Nickel Co. 6

J

Johnson, Matthey & Co. 11
Jones & Glassco 10

L

Ledoux & Co. 11
Lymans, Ltd. 6

M

MacKinnon, Holmes & Co. 3
Murphy, Chas. J. 11
Mussens, Ltd. 10

N

Nova Scotia Steel & Coal Co....2 and 4
Nova Scotia, Province of..... 8
Northern Canada Supply Co., Ltd. 7

O

Ontario, Province of ..... Inside Back Cover

Q

Quebec, Province of 8

S

School of Mining 5
Segsworth, R. F. 12
Smart, Turner Mfg. Co. 9
Smith & Durkee Diamond Drill Co. 11
Smith & Travers Diamond Drill Co. 12
Smith, Sydney 11
Spearman, Chas. 11
Standard Underground & Cable Co., Ltd. 9
Sullivan Machinery Co. 2

T

Toronto Iron Works, Ltd. 9
Tyrrell, J. B. 11

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