

THE CANADIAN MINING JOURNAL

VOL. XXXVII.

TORONTO, October 1, 1916.

No. 19

The Canadian Mining Journal

With which is incorporated the
"CANADIAN MINING REVIEW"

Devoted to Mining, Metallurgy and Allied Industries in Canada.

Published fortnightly by the

MINES PUBLISHING CO., LIMITED

Head Office 263-5 Adelaide Street, West, Toronto

Branch Office 600 Read Bldg., Montreal

Editor

REGINALD E. HORE

SUBSCRIPTIONS — Payable in advance, \$2.00 a year of 24 numbers, including postage in Canada. In all other countries, including postage, \$3.00 a year.

Advertising copy should reach the Toronto Office by the 8th, for issues of the 15th of each month, and by the 23rd for the issues of the first of the following month. If proof is required, the copy should be sent so that the accepted proof will reach the Toronto Office by the above dates.

CIRCULATION

"Entered as second-class matter April 23rd, 1908, at the post office at Buffalo, N.Y., under the Act of Congress of March 3rd 1879."

CONTENTS

Editorials—	Page
Nickel Fiction	455
Our Industrial Resources	455
Molybdenite	455
Increased Production of Metals	456
That Blacklist	456
Reports for Investors	457
Safety First vs. "Is It Safe?" By F. W. Gray	459
The Industrial Problem	460
The Concentration of Molybdenite by Flotation	461
Canada's Water Powers	462
The Arctic Expedition	463
The Herb Lake Gold District. By R. C. Wallace	466
Ontario's Metal Production. By T. W. Gibson	467
Sulphide Deposits at Flin-Flon and Schist Lakes, Manitoba	468
Arizona Meeting A. I. M. E.	470
Book Reviews	473
Personal and General	474
Special Correspondence	475
Markets	478

NICKEL FICTION

In our last issue we called attention to the absurdly low valuation placed on nickel matte in the reports of the Department of Trade and Commerce. We suggested that the Department must be publishing figures handed to it, rather than figures which could be relied upon as the result of careful enquiry by the Department. Our assumption seems to have been correct, for we are advised that the figures are in fact not collected by the Department. Perhaps the Customs Department can explain why nickel matte exported from Canada is not given a value that is approximately correct.

The statement that a quantity of nickel matte is worth \$1,779,801 should properly be interpreted to mean that the value has been carefully worked out and is accurate to the last dollar. Otherwise we would expect round numbers to be used. The repeated use of absurd valuations is not creditable to any department.

OUR INDUSTRIAL RESOURCES

In a leaflet published and distributed by the Department of Trade and Commerce we find the following:

"The power of a nation is the producing power of her industries. Canada must find out what this producing power is and then develop it. The capacity of every plant must be gauged. The ability of every man must be known.

"A nation's prosperity is mechanical; it is electrical; it is chemical; it is mining, manufacturing, transportation; it is every phase of Engineering.

"Canada must survey its industrial resources. The channels of commerce must be charted. Each source of supply must be sounded."

The Department of Trade and Commerce is making a praiseworthy effort to help Canada's industries. It is to be hoped that the mining industry will be well represented at the National Business Conference to be held this fall at the instance of the Right. Hon. Sir George Foster. His department can do a great deal of good if it receives proper support. If our resources are to be used to greatest advantage, we must know what they are. The Department of Trade and Commerce wants information which can be used to further the interests of Canada. Can you help? Can you supply useful information? Will you do it?

MOLYBDENITE

Molybdenite has come into great prominence on account of the war, and it seems likely that Canada is to become an important producer of molybdenum and its

compounds. On another page will be found some account of the concentrating plant recently put into operation at Renfrew. That plant is treating ore from eastern Ontario mines and has recently received a shipment of rich ore from Amos, Quebec. We are advised that great progress has been made at Quyon by the Canadian Wood Co., which is now shipping 250 to 300 tons of ore per week. Out in British Columbia some excellent ore has been developed at the Molly mine. At Orillia molybdic acid and ammonium molybdate are being produced, and preparations are being made for producing ferro-molybdenum in large quantities.

INCREASED PRODUCTION OF METALS

On another page will be found the Bureau of Mines report on production of Ontario's metalliferous mines for the first six months of 1916. This shows an increase in all items except iron ore. The production of silver was considerably smaller, but the value much greater. Large increases in production of gold, nickel and copper are the most notable items. Both in amount and in value these metals show increase of over 30 per cent. The demand for iron and steel is well illustrated by the larger output and higher price of pig iron from Ontario smelters.

THAT BLACKLIST

We are still without a blacklist of enemy firms; but there are some indications of activity in official circles. "Monetary Times," which has advocated that something be done, says:

"Attention has been called in these columns to the fact that a blacklist of enemy firms has not been established in Canada. It will be recollected that more than two months ago the British Government established a blacklist of United States firms with which citizens of the United Kingdom were forbidden to trade. Much unfavorable comment has been heard because Canada, as yet, has failed to follow the example. As it is illegal and undesirable for citizens of Great Britain to trade with these enemy firms, it is equally undesirable for Canadians to trade with them. The attention of the authorities at Ottawa has been called to this matter, and it is pleasing to know that they are giving it consideration. It is scarcely too much to hope and anticipate that the Dominion, as a unit of the British Empire, will fall into line in this important matter, as it has done in others."

REPORTS FOR INVESTORS

Frequently it happens that an engineer is called upon to examine for prospective purchasers a property in a district with which he is unfamiliar. He gathers information from any available source, visits the property and samples carefully the deposits to which his attention is directed. He examines also all nearby

enterops and endeavors to interpret the structure. If there are workings on neighboring properties, he visits these and gathers what he can from the experience of those who have operated in the district. Then with his notes, maps and samples he returns. When the samples have been assayed and studied in conjunction with the information already gathered, the engineer forms some opinion of the value of the property. He cannot tell just how much the property is worth, for he has not sufficient information. Having exhausted available sources of information, however, he must decide whether his clients are or are not warranted in paying the price asked. To many clients the most satisfactory answer is "yes" or "no." Some clients; however, want a detailed report, parts of which they understand and other parts of which they do not understand, but which are frequently of value when interpreted by other engineers.

Many engineers, when asked to write out a detailed report find difficulty in confining their attention to what they themselves consider the important facts. The value of the ore in sight, the probable extent of the deposit, the cost of mining, treating and marketing, and other such important matters, are in some reports not properly emphasized, while geography and geology are dwelt on to an extent which indicates that failure to make observations in the field has resulted in liberal clippings from printed geological reports.

When properly used, geological reports are of considerable value to the mine operator. Detailed studies of structure of the ore deposits are particularly useful, and, together with the results of careful sampling, are of vital importance. That geological descriptions are, however, misused by those who write reports is indicated by the following clipping sent to us by Prof. A. C. Lane, of Tufts College, Mass. Our readers will agree that Mr. Newkirk's criticism is just. If he had to depend on that geological description to reach a decision, it is no wonder that he protests.

A Porcupine Mining Report.

"The formation of the Porcupine belt is largely of volcanic origin. The igneous Keewatins predominate and are much schisted. Associated with them are the rusty carbonates, characteristic of the gold-bearing districts of northern Ontario. Conglomerates frequently overlay the igneous rocks, with pillow lava intrusive in the conglomerate. The sedimentaries are also markedly schistose. Quartz porphyry is intrusive. Serpentine occurs in large volume."

The above is from a report on an Ontario gold mine just received by the writer.

I have been awaiting the report on this mine with ill-concealed and eager impatience, yet now that it has arrived and I have read it over several times I hardly know what to do about it.

Pending the arrival of this report, I told myself confidentially that if the report proved to be promising I would invest a few thousand dollars in this district. Having perused the report until mental collapse threatens, I must confess I am up in the air on the proposition.

I hate to find fault, and yet I am frank to say the above mining report does not suit me. I work other people hard to earn my money, and I don't propose to fritter it away in any mining proposition that is in a condition such as the above one seems to be.

In the first place, the report states that the Porcupine belt is largely of volcanic origin. I do not object to that—in fact, I would not ask to have the volcanic

origin changed on my account at all, but I hate like everything to see the "igneous keewatins predominate." Who are "igneous keewatins," anyhow, that they always seek to predominate over everything? They ought to be taught their place in a mining report. Not only that, but they are "schisted"—this report admits it. Fancy a foxy mining investor like myself, for instance, investing his money in "igneous keewatins" broken out all over with schists!

The "rusty carbonates" are all right, too. I naturally expected a few of those, and I don't think they do any particular harm unless they get too rusty; but this can be prevented by rubbing them with an oiled rag now and then.

As for the "conglomerates," they should not militate against operating this mine, nor dilute the richness of the gold-bearing quartz—provided the mine owners put in an up-to-date conglomerator to handle 'em. At least, that is my opinion, and with my wide knowledge of mining interests it ought to be worth something.

I am free to state that the above report presented an unsurmountable objection to me until I read down to that portion of it which states:

"The sedimentaries are also markedly schistose."

Right there is where I began to lose an investing interest in this mine. What can be done, I ask, when the "sedimentaries are markedly schistose"? Absolutely nothing can be done! You just have to sit back and let 'em remain so; that is all. Mining experts have tried to cope with this sad state of affairs, but they have always failed ignominiously. Now, if it were the alimentaries instead of the "sedimentaries" that were affected in this deplorable manner, something might possibly be done about it; but when a "markedly schistose" fastens on to a "sedimentary"—good night!

N. N.

MINING MACHINERY WANTED BY RUSSIANS.

With reference to mining machinery needed for the Ural Gold Mining industries (Weekly Bulletin No. 657), the British Board of Trade Journal states that the Board of Trade have received information to the effect that the official Bulletin of Laws of Petrograd of June 28/July 11 publishes a decree of the Minister of Commerce, dated June 22/July 5, giving a list (as follows) of the machines, apparatus, appliances, etc., which are to be admitted, for a period of ten years, free of customs duties, for the requirements of the Siberian and Ural gold mining industries, in accordance with the Imperial Decree of 13th/26th May, 1916:—

1. Dredges complete with all machines, boilers, engines, pontoons and accessories, fitted together or otherwise according to specifications furnished by the sellers or by the works constructing the machines, apparatus, accessories, and their parts.

2. In dredges driven by electricity: dynamos, electric motors with cables and distributing arrangements; protecting and measuring appliances; transformers; electric stations, to be placed on the river bank or in barges and developing power for the engines on the dredge; all steam engines, boilers, motors at the station, electric generators, power conducting apparatus, and in general everything necessary for the fitting up of the station.

3. Parts of dredges (clause 1), whether imported with them or separately, viz.: (a) pontoon parts, steel, iron, or wooden, viz.: steel and iron sheets, iron assorted, sheared, drilled or punched; pile supports, slippers for them, frames, bolts, etc.; the bucket lead

with all appurtenances, viz.: brackets, beams, rollers, bucket chain line, scoops, scoop bolts, and steel and iron lips for buckets and ropes, rubber belts, upper and lower drums, bearing blocks, pinion wheels and bearings, hoist of the upper drum, hoisting mechanism of the bucket lead (winch, tooth gearing); (b) parts of the washing apparatus: trommels with friction gearing, gold-catching tables and sluices, screens for them, discharging bin, spraying pipe, steel sheet screens; trommel fittings, including rollers and tooth gearing; (c) parts of tailings discharge apparatus: 2 gravel and sand conveyers, gravel elevators, hoists for conveyers; (d) parts for dredging control: main hoisting gear pertaining to the set of trommels and cables, piles, admission gear rods, steel ropes, foundation plates and bolts; (e) parts of dredge adjuncts: pumps, pipes, valves, hoists, belting, accessories for heating and fire service appliances; (f) parts of electrical equipment for electrical dredges: electric stations on the bank or on a special barge for serving the dredge (engines, dynamo-engines, switchboards, protecting and measuring appliances, transformers, cables, electro-motors); (g) parts of the steam dredge; steam boilers, engines, condensers, and driving gear.

4. Excavators complete with all machines, boilers, mechanism, washing arrangements, electro-locomotives, steam locomotives and appliances for removing turf and overburden, except rails and trucks, according to the specifications furnished by the sellers or works constructing the excavators.

5. Parts of the above (clause 4), whether imported with the machines or apparatus or separately, viz.: buckets, bosses, bolts, drums, chains, steel lips for buckets, washing and catching apparatus, electro-locomotives, etc.; parts of boilers, engines, motors and electro-locomotives on the excavators.

6. Appurtenances and mechanism for prospecting dredging areas: all kinds of drilling apparatus—steam, electrical, hand, animal power—with all accessories; drill hole piping, sleeves, drilling bits, sand suction pumps, slippers, ropes and pulleys, according to specifications furnished by the sellers or works.

7. Parts of the above (clause 6), imported separately or otherwise, viz.: drill hole piping, sleeves, drilling bits, sand suction pumps, nuts, slippers, keys, ropes, pulleys, four-wheeled drill carriages, headframes, winches, hand and all other, with their accessories; counterbalances with pulleys, steam engines driving the drilling and winch mechanism, steam boilers, electro-motors, rheostats, dynamos.

8. Apparatus, appliances, machines and mechanism for crushing gold ores and for extracting from them gold by chemical processes, viz.: crushers, rolls, Chilean mills, stamps, mortar boxes, screens, transporters for hoisting ore, automatic feeders, metallic and other appliances for catching gold, sand pumps, cyanide solutions; tubular, spherical and other mills; feeders for passing ore and semi-products to the crushing and extracting appliances; levellers, classifiers, with all their accessories; metal vats and bins for collecting slime and solutions, filter presses with their filter frames and fittings; vacuum filters and agitators with their fittings, air compressors for agitating slime, vacuum pumps, air receivers, mechanical mixers, piping and connecting parts and fittings and bolts; motors for driving the above appliances; appurtenances for smelting residues and for cleansing gold.

9. Parts of apparatus, appliances, machines and mechanism for crushing gold ores and for extracting gold by chemical processes (clause 8), whether im-

ported with the above or separately, viz.: bushing, wearing plates, gold-catching apparatus, fittings, pipes, flanges with connecting parts, dies, tires, mill runners, shafts, cams, tooth wheels, valves, filter frames, belting and cocoon matting.

10. The machines, apparatus, appurtenances and parts mentioned in this list are admitted duty-free according to the regulations of the 15th/28th June, 1916, for the duty-free admission of dredges and excavators imported for the Siberian and Ural gold-mining industries.

AN UNSUITABLE SITE.

Mr. R. W. Leonard, commenting on the site of the proposed nickel refinery, says in the Bulletin of the Canadian Mining Institute: "Every British subject who has considered the subject will probably agree that the supply of such an essential element in war munitions as nickel, and so vital to the safety of the Empire, should not be dependent upon refineries located in foreign countries, and, therefore, it is better to have a refinery established in British territory. Again, every intelligent person will agree that such a refinery should be established in a safe part of the Empire where it could not easily be damaged or destroyed by a possible enemy either acting as a nation, or by possible raiders from a neutral country. The newspapers report that the International Nickel Co. have selected Port Colborne, Ontario, as a site for a refinery to manufacture nickel for the British Empire. Port Colborne is on the shore of Lake Erie at the south end of the Welland canal. It is within long range gun fire of United States territory, and especially vulnerable from Lake Erie, which here forms part of the international boundary, and, of course, equally vulnerable to bombs dropped from dirigibles, aeroplanes or hydroplanes, and most accessible to raiders over the border."

GRANBY.

Spokane, Wash., Sept. 10.—The Granby Mining, Smelting & Power company, with mines in different parts of Alaska and British Columbia, together with immense copper smelters at Anyox and Grand Forks, B. C., is producing an average of 4,000,000 lb. of blister copper monthly, according to Frank M. Sylvester, of Vancouver, B. C., general manager, who is in Spokane conferring with local stockholders. He states that all difficulties of a mining and metallurgical nature that hampered operations at the Anyox smelter and Hidden Creek mines during the first year or so that they were in production have been overcome, and conditions now are satisfactory in every way.

"In pursuance of the company's policy of expansion, which contemplates the Anyox smelter and the Hidden Creek mines as the nucleus of an immense industry, we always are on the lookout for promising new properties, and in the last year we have had not less than 100 examined by our engineers," said Mr. Sylvester. "Of our newer properties two now are on a substantial producing basis. The Midas mine at Valdez, Alaska, is shipping to the smelter at Anyox between 3,000 and 4,000 tons of ore monthly. The Mamie mine on Prince of Wales island, also in Alaska, is shipping between 4,000 and 5,000 tons monthly. A number of others are producing on a smaller scale. We are able to get this tonnage moved because through a subsidiary company we own and operate our own fleet of steamers.

"The Grand Forks plant put its seventh furnace into operation on Thursday, September 7th. As the Crow's

Nest Pass Coal company now seems to have overcome its labor troubles and to be in a position to keep us supplied with coke, I anticipate that we shall soon have the eighth furnace blown in and be running at full capacity once more."

Rossland—The London office of the Le Roi No. 2, Ltd., has sent out the following report, received there from the company's managers at Rossland: Josie Mine Report for July: Shipped to Trail, 1,404 tons of ore. The receipts from the smeltery are \$15,252, being payment for 1,114 tons of ore shipped; sundry receipts, \$65; total \$15,317. Estimated working costs for the corresponding period were \$7,000 for ore production; other expenditures were \$20 on capital account and \$6,000 on development (including diamond drilling); total expenditures, \$13,020.

The total quantity of ore received at the Consolidated M. & S. Co.'s smelting works at Trail from Rossland mines during eight months to September 1st, 1916, has been 227,954 tons, by far the greater part for the company's Centre-Star-War Eagle and Le Roi mines, as follows: Centre Star group, \$125,605 tons; Le Roi, 91,247 tons; Le Roi No. 2 Co.'s Josie group, 11,031 tons, and Velvet, 71 tons.

THE SILVER BULLET.

"Monetary Times" commenting on the war loan says under date of Sept. 22:

"Canada's second war loan of \$100,000,000 has been well oversubscribed. The subscriptions range from \$100 to \$5,000,000, representing investors large and small who have decided that by lending their money to their country, they are helping to bring peace nearer. As an investment, the Canadian war bond is the best in Canada. It is one of the best bonds to be bought anywhere. Behind it is a fertile country of great natural resources and possibilities of expansion. Behind it is the British navy, still mistress of the seas, considerate to neutrals, firm with enemies. Behind it are the men, the money and the determination to bring the war to a successful conclusion, for right and civilization.

"The oversubscription of the first war loan issued in Canada in November last was, as we then said, a well-made silver bullet in the hide of Prussian militarism, autocracy and barbarism. The oversubscription of the present loan is another such bullet. Canada is willing to manufacture these bullets until peace is brought to the Empire and its Allies. The success of the loan is a further indication of our resolve to fight the war to a conclusive finish. It is one of a hundred similar incidents occurring every day in the Motherland and in the outposts of the Empire.

"While Germany is making frantic efforts to have its fifth war loan subscribed, with the future dark and foreboding, defeat looming in the distance, the British Empire is raising, with comparative ease, hundreds of millions for the conduct of the war. The silver bullet is scoring heavily. The material at hand for its making is still sufficient to give the Hun an additional shiver."

COPPER PRICES

The demand for copper continues. It is reported that two of the largest American producers have made sales for several months ahead at about 27 cents per lb. Britain and her allies are paying good prices for American copper. We are advised, however, that Germany has to pay 80 to 90 cents per pound for what she can secure in Norway.

"SAFETY FIRST" VS. "IS IT SAFE?"

By F. W. Gray.

English newspapers announce that the much-advertised and well-known injunction: "Safety First!" is being superseded in Britain by the questioning phrase: "Is it Safe?"

There have always been certain objections to the phrase "Safety First," although not to the course of action this slogan seeks to inculcate. Safety, first and foremost, is not the most desirable thing in life and industry. The provision of the things that sustain human life and civilization comes first, and this is not always compatible with absolute safety. Safety is certainly not the first consideration of those who go down to sea in ships, or of those who work in mines, on railways and in hazardous occupations. The man who desires absolute safety would be well advised to stay in bed. The phrase "safety first" has of course risen from a natural reaction against the placing of other considerations ahead of human safety, such considerations as profit and production. At one stage of the industrial evolution of the United States, the safety of the workers was about the last thing that was considered, either by the employers of labor or the workmen themselves. A different viewpoint is held today. Man is realized to be greater and of more value than his machines, and public opinion has swung around to the viewpoint of safety as a prime consideration.

The English phrasing suggests another point of view. The phrase "Is it Safe?" has the arresting virtue of a question. It suggests that there may be a safe way and an unsafe way of performing a given operation, and it appeals to the worker to use his brains in making his choice of method.

It is a commentary on the sanity of the British outlook, and the practical common-sense of the race, that, even in these times, when the phrase "safety first" sounds like an echo from a by-gone and halcyon age, the logic of a transatlantic phrase should be questioned, with a resulting modification of the wording to conform with the British idea, namely, that every operation should be approached with a questioning attitude as to the safest and most workmanlike method, but with the mental reservation that, whether safe or not, the accomplishment of the task is the first consideration.

NEW PLANT AT ASBESTOS MINE.

The Asbestos Corporation of Canada have now completed their new cable-derrick equipment at the King mine. This plant consists of four cableway units, built by the Flory Manufacturing Co., of New York. Each unit consists of a carrier steel cable, 2½ in. in diameter, 892 ft. span, supported by two towers, 78 and 45 ft. high respectively, equipped with hoisting machinery, hoisting cable, conveying cable, etc., and capable of hoisting 10 tons, with a traction speed of 800 ft. a minute, while the hoisting speed is 266 ft. a minute. A feature of the plant is that the towers, the anchorage platforms, hoisting machinery, are all on wheels moving on rails, so that the whole cable derrick can be moved about very easily by a special motor. A double unit crushing plant is now being installed and will be completed in September. The object of this crushing and drying plant is to fill a large storage bin with milling rock which will supply the gyratory crushers of the asbestos mill. The milling operations, with this large

storage bin supply to draw on, will therefore be independent of the mining operation, which could be suspended for some little time without affecting the work. The capacity of the completed plant will be 2,000 tons of rock per 10-hour shift, which would be approximately a capacity of 1¼ million tons a year on two shifts a day if the asbestos mines were worked continuously.

Very notable improvements have also taken place at the Jeffrey mines of the asbestos and asbestic mines at Danville, in their methods of mining. In the new workings, in the extension of the pits, the rock in the different benches is being handled by steam shovels which load direct on the cars supplying the mill; and the intention is to eventually do away with the cable-derricks, which will be replaced by an incline.

In the last four months the Bell Asbestos Mines have remodelled the mill, which has now reached a high efficiency. The steam boilers which used to supply about half the power necessary for operating the mine and the mill have been discarded for electric power. It may be mentioned that there is now a tendency to return to electric power for operating the mines and the mills in the asbestos district. In fact, only one operator is now using steam power. Some four years ago, on the contrary, electric power was being abandoned and replaced by steam plants. The new order of things is, in a great measure, due to the fact that the Continental Light and Power Co. and other electric power companies are now supplying the power on the meter system; whereas, before the contracts were made for so many horse-power a year, which had to be paid for whether used or not.

THE PRICE OF MICA.

In a U. S. Commerce report under date of September 15th, 1915, Mr. F. S. S. Johnson, U. S. consul at Kingston, Ont., says:

"The price of fine-split amber mica, size 1 by 2, at present exported largely from the Ottawa district, and invoiced at from 20 to 35 cents per pound, is very low when the following facts are taken into consideration: Market value per pound of rough amber mica, 1 by 2, 12 cents; price paid for splitting 1 pound of amber mica, 12 cents; waste on 1 pound of fine amber mica, 4 cents; freight and handling from mine to factory, one-half cent; profit, 8 cents; total, 36½ cents.

"Most of the Ontario mica is mined in this consular district and taken to Ottawa to be trimmed and prepared for the American market. The fine-split amber mica is invoiced at this consulate at from 33 to 38 cents per pound."

The average price of sheet mica, including cut and uncut, in the United States in 1915, as deduced from the total production, was 68 cents a pound, as compared with 50 cents a pound in 1914 and 21 cents in 1913.

According to the preliminary report of the Mines Department, Ottawa, Canada exported to the United States in 1915, 879,631 pounds manufactured mica, valued at \$236,124.

PORCUPINE CROWN.

The development work at Porcupine Crown mine has been recently unusually interesting. In a winze below the 800 ft. level very good ore has been found. As the main orebody was high grade, the development of low grade ore with depth was disappointing. Now rich ore is being found at greater depth, and the outlook has brightened considerably.

THE INDUSTRIAL PROBLEM

Mr. C. V. Corless, of Coniston, has an excellent article on the industrial problem, in the September number of the Canadian Mining Institute Bulletin. Regarding the solution, he says: "We are safe in saying that centuries may be required in working out the solution to the industrial problem, since this is merely a problem in social evolution. Social evolution is merely the continuous adjustment of social relations to meet changing conditions. As long as these change, we must have the problem with us. It is easy to adjust the parts of a machine. But when each part is itself infinitely complex—is, in fact, a human being, whose adjustment in industrial relations must be self-adjustment—it is self-evident that any real mitigation of industrial ills must be founded on the gradual growth of intelligence and ethical feeling. This I believe to be the surest way permanently to conserve and further to develop for industry the good results that Dr. Browne notes as arising from the war."

Mr. C. M. Gayley, of Berkley, says on the same subject, suggested by an article by Dr. David Browne, which was published in the Bulletin and in the Canadian Mining Journal:

"Dr. Browne is right. What we need in America as well as in Canada, is good-will and mutual interest between employer and employee—the cultivation and the maintenance for all time of the self-respect, the loyalty to worthy ideals, the habit of co-operation, that, as the result of the most wanton and saddest, and still grandest and most enduringly victorious of all conflicts for liberty, justice and democracy, have been instilled in the consciousness of all nationalities of Anglo-Saxon heritage."

Mr. R. W. Brigstocke, of Naughton, says:

"In my opinion, Dr. Browne's aspiration can be realized only if industry can be so organized that men will be employed at work which is or is made congenial to them; and, what is even more essential: if we can inculcate in our people the spirit of 'team play' in industry. Whether or not this implies the adoption of a form of socialism is immaterial. What is material, to secure the maximum national and industrial efficiency, is the promotion of the happiness and welfare of the greatest number."

THE I. M. & M. AND TAXATION OF MINES.

On the invitation of the Institution of Mining and Metallurgy, a largely attended meeting of representatives of mining companies was held at River Plate House, Finsbury Circus, London, E. C., on August 8th. The meeting was convened to decide the action to be taken in regard to a "representative appeal" to the Excess Profits Tax Board of Referees in accordance with the terms of the correspondence, which was read, between the Institution and the Chancellor of the Exchequer, and also in regard to other questions affecting the economic interests of the mining and metal industries.

Mr. J. H. Corder-James, vice-pres. Inst. M. M., presided, and in the course of his opening remarks he stated that the present system of taxation and other economic questions affecting the future of these industries had engaged the attention of the Institution for some time past. He also referred to the fact that the Institution of Mining and Metallurgy, the Iron and Steel Institute of Metals and the Institution of Mining Engineers, as representing all the branches of the mineral and metal industries, are acting together in urging

upon the Imperial Government the necessity, in the national interest, for the establishment of a department of minerals and metals in the metropolis of the empire to co-ordinate information on its mineral resources, to assist and stimulate their development and to safeguard the economic interests of the mineral and metal industries.

Other speakers dealt particularly with the larger question of general taxation and gave concrete examples of gross anomalies in its incidence as affecting mines operating outside the United Kingdom, but registered and controlled in London. While recognizing that it was incumbent on all industries at the present time to make their maximum contribution to the National Exchequer, it was pointed out that the income and excess profits taxes on certain mines in their present forms were equivalent to confiscation of capital value, and that the result inevitably would be the restriction of output of certain metals, especially gold, and the removal on a large scale to other centres of mining companies at present domiciled in the United Kingdom. All were in complete agreement as to the necessity for immediate consideration of these wider questions with a view to joint action to secure reform.

The following resolutions were unanimously adopted, and the chairman briefly outlined the procedure in connection with the excess profits tax appeal:

1. That this meeting of representatives of the Mining Industry approves the action taken by the Council of the Institution of Mining and Metallurgy in regard to the excess profits tax, and pledges itself to support the Institution in the representative application to the Board of Referees referred to in the correspondence between the Institution and the Chancellor of the Exchequer.

2. That the following gentlemen be and are hereby appointed a committee, with power to appoint alternates, to act with the Council of the Institution in connection with the "representative application" to the Excess Profits Board of Referees and, later, in connection with wider questions affecting the mineral and metal industries, and in particular the effect of the present system of taxation of those industries: The Right Hon. Lord Harris, Sir Lionel Phillips, Bart., The Right Hon. Sir Alfred Mond, Bart., M.P., Sir Trevredyn R. Wynne, Mr. F. W. Baker, Mr. Edmund Davis, Mr. F. A. Govett, Mr. F. H. Hamilton, Mr. Henry C. Taylor, Mr. Leslie Urquhart, Mr. Oliver. Wethered and Mr. Robert Williams, with power to add to their number.

3. That a fund be subscribed to meet the necessary expenses in giving effect to the preceding resolutions, such fund to be administered by the Institution of Mining and Metallurgy in conjunction with the appointed committee.

The secretary, Mr. C. McDermid, will communicate direct, at an early date, with mining companies, and all correspondence on the subject should be addressed to him at the House of the Institution, No. 1, Finsbury Circus.

McINTYRE.

Good progress is being made at the McIntyre properties, and it is expected that McIntyre will show good earnings for the quarter ending September 30th. Considerable increase in production will be possible next year, when construction and development now under way become effective. The central shaft will be equipped for a larger tonnage, and an aerial tram will carry the ore to the mill.

THE CONCENTRATION OF MOLYBDENITE BY FLOTATION

There has just been put into operation at Renfrew, Ontario, by the recently organized International Molybdenum company a plant for concentrating molybdenite. The process is a simple one and appears to be working very satisfactorily.

Some time ago the Orillia Molybdenum company, with which Mr. G. P. Grant was identified, established a refinery at Orillia and began the manufacture of molybdic acid and ammonium molybdate, for which there is now an excellent market. Experiments carried on in the Orillia laboratory resulted in the development of a very efficient process for concentrating molybdenite ores. Recently the Orillia company was merged with Mr. M. J. O'Brien's interests in a new company, the International Molybdenum Co., of which Mr. J. L. Murray, of Renfrew, is president. It was decided to build at Renfrew, using the process devised by Mr. Grant's company. This is now in successful operation.

When visited by the writer, the plant was running on low grade ore said to average less than one per cent. molybdenite. From this a rich concentrate, said to carry 70 to 80 per cent. molybdenite, was being obtained by one run over the "float," as the machine is called. This product is rich enough for treatment at the refinery. The grade is raised by screening, which removes a considerable part of the more finely ground material, largely iron sulphides.

It has been found advisable to keep the feed rather coarse, as very finely ground ore is much more difficult to treat. Good results are obtained from particles over 60 mesh, and it is probable that best results will be obtained from a feed between 20 and 60 mesh.

The machines will be described in detail in a later issue of this Journal. A brief description of the process follows:

The ore after passing through a gyratory crusher is ground by rolls. The crushed ore is fed dry to a drum revolving in water at the head of the float: a large percentage of the sulphides, including almost all the molybdenite, is thus floated. The stream passes down a gently-inclined box 12 ft. long. The iron sulphides are carried along with the molybdenite until they strike baffle boards, which help to sink them. The baffles are vertically placed boards, over the edge of which the water carries the molybdenite. They interfere very little with this mineral, but cause sinking of the other minerals.

No acids or oils are used in the process. The sulphides float readily on water and the baffles sink the undesirable ores, leaving the molybdenite.

The plant can treat about 50 tons in 12 hours. The company mines ore and is in the market to buy ore. The concentrates will be refined at Orillia, and the molybdenum will be used in the manufacture of molybdic acid, ammonium molybdate and ferromolybdenum.

KOWKASH.

Timmins, Sept. 13.—Kowkash district has not done so badly. Within a year from discovery this new camp on the Transcontinental, 300 miles west of Cochrane, had its first private car. Last week-end a car of shareholders of the Tash-Orn Co., from Baltimore, Buffalo and other American cities, were in looking at their gold showings and claims.

The Tash-Orn Gold Mines, Ltd., have 14 claims around Tashota. The holdings are: Devanney-Morrison, four claims; Kline, four; Brennan, two; McDougall, one; Morrison, one; Wells, one. On the latter

claim, the Wells, quite a deal of work has been done. A shaft is down 30 ft. and is to be sunk to 200 ft. At the surface the Wells had a series of seven or eight stringers, two or three inches wide. At the bottom of the shaft these have developed into an all-quartz vein. Free gold shows in it. On this claim the company will this fall install a six-drill compressor, two Tremains stamps and other machinery.

On the Devanney-Morrison claims there is a quartz-schist vein that at the surface and in the bottom of the 18-ft. shaft is about 7 ft. wide. Eight hundred feet of diamond drilling is being done here. The drill struck the vein at the 125 ft. and it was 16 ft. wide, according to good reports. This vein has been stripped for several hundred feet, several test pits have been sunk on it, and values show up big. This claim is one and a-half miles north of the railway. Most of the Tashota claims are hard by the railway, clustering close and handy to the track, as they do at the Boston creek on the T. & N. O.

The company intends to work most of the other claims it controls or owns, and will build central camps at the railway.

Veins showing large quantities of tellurides—possibly tellurides of bismuth, which are not thought much of—are included in the score of veins uncovered on the Kapps-Hendrickson claims. J. Guthrow is following up a strong lead on his claim by stripping. Sinking a short way has been done on the Gravelle-O'Gorman claim.—Toronto World.

ANDERSON'S PARTY BACK.

Seattle, Wash., Sept. 11.—The steamship Northwest-ern arrived from Nome, Alaska, to-day with seven members of the Vilhjahnur Stefansson Canadian Arctic expedition that left Victoria, B.C., in the whaler Karluk, June 17th, 1913.

The men are Dr. Rudolph M. Anderson, of Des Moines, Iowa, second to Stefansson in command of the expedition; John J. O'Neill, geologist, of Port Colborne, Ont.; John R. Cox, topographer, Ottawa, Ont.; Diamond Jennes, anthropologist, Wellington, N.Z.; Fritz Johansen, naturalist, Copenhagen; George H. Wilkins, photographer, London, and Kenneth G. Chapman, topographer, New York. Anderson and his party will go direct to Ottawa to report to the Canadian government on their achievements.

Anderson and his accompanying scientists escaped the misfortunes that were encountered by the branch of the expedition that went from Nome on the Karluk, which was wrecked in the Arctic ice in the first winter out. Thirteen members of the Stefansson expedition, including five scientists, perished in the north.

ST. ANTHONY GOLD MINE.

Toronto, Sept. 23.—An announcement was made yesterday of the sale of the St. Anthony mine at Sturgeon lake, near the Transcontinental railway, and about 100 miles northwest of Port Arthur. For a year an option has been held on the mine, and during that time the purchasers have spent about \$90,000 in proving it up. The St. Anthony was opened up about ten years ago, but owing to financial difficulties it was closed down a few years ago. Geo. Glendinning, formerly of Cobalt, bought the property, and he has now sold it. The purchasers are the Lewishons and D. M. Steindler, of New York. Considerable gold has been produced from the mine, but the treatment of the ore presented some difficulties, which the new purchasers are evidently satisfied they can overcome. The purchase price has not been made public, but a first payment of \$60,000 was made this week.

CANADA'S WATER POWERS

Water power has played a most important role in the industrial development of the Dominion, and with the advances in electrical science, will play an even more important role in the future. Probably no country in the world is more fortunate in the extent and location of its white coal than is Canada. Practically every commercial centre from coast to coast, except only a few in the middle prairie provinces, have abundance of water power available, not only for present needs, but for all anticipated requirements. Indeed, the fortunate location of Canada's water powers is the outstanding feature of her water-power resources.

Furthermore, where there is not sufficient white coal available to furnish energy requirements, there is an abundance of black coal. So far as sources of energy for power producing agencies are concerned, Canada's position is pre-eminent.

Within the provinces of the Dominion of Canada, and excluding the Northwest Territories, practically all of the Yukon, and the northern and eastern portions of Quebec, it is estimated that 17,746,000 horse-power are available, this amount being inclusive, in the case of Niagara Falls, Fort Frances and the St. Mary's river at Sault Ste. Marie, of only the development permitted by international treaties, and, further, does not contemplate the full possibilities of storage for the improvement of present capacities. The developed powers, which are inclusive of all water powers, whether for electrical production, pulp-grinders, for mining and milling, or for the great many other uses, aggregate 1,712,193 horse-power, the distribution throughout the respective provinces being shown in the table hereunder:

Developed Power in Canada.

Province.	Horse-power Developed.
Nova Scotia	21,412
New Brunswick	13,390
Prince Edward Island	500
Quebec	520,000
Ontario	789,466
Manitoba	56,730
Saskatchewan	45
Alberta	33,305
British Columbia	265,345
Yukon	12,000
Total	1,712,193

The extent of the future development can be only limited by the available water powers. Practically all of the 1,712,193 horse-power enumerated above as developed from water power has been created within the last twenty years, and of this the last decade has seen practically two-thirds of the total produced. If such a rate of increase were projected into the future the 8,000,000 horse-power estimated to be available within range of present markets, will be entirely in use within fifteen years, and even by liberally discounting such a rate of increase, notwithstanding our confidence in being upon the threshold of an inconceivably prosperous future, such a condition of development may be readily approached within a generation.

With water power as a fundamental necessity in the industrial future the regulation and conservation of the river waters is to-day being demanded on a large scale, and this will naturally become more insistent as time goes on. It has been fortunate that, in Canada, the title to the water-power rights have largely remained under the control of the Dominion or Provincial Govern-

ments. The Dominion Government controls navigable streams and their water powers throughout the Dominion and the water powers in general of the provinces of Manitoba, Saskatchewan and Alberta. The administration of all water powers in British Columbia, Ontario, Quebec, New Brunswick and Nova Scotia is under respective provincial control.

The administrative policy of the Dominion Government and the various provinces may be readily studied in the five monographs included in a book recently published by the Dominion Water Power Branch, Ottawa. These treat in a "popular" way of the water powers of British Columbia; the prairie provinces of Manitoba, Saskatchewan and Alberta; Ontario; Quebec; and the maritime provinces of Prince Edward Island, New Brunswick and Nova Scotia. While it is impossible to treat in detail of the various sites and power developments existing throughout Canada, the more important are at least described in the most essential features.

These five monographs were originally prepared and published for distribution in connection with the water power exhibit of the Dominion Government in the Canadian pavilion at the Panama-Pacific International Exposition, and particularly for distribution to the members of the International Engineering Congress at San Francisco, September 20-25, 1915. Owing to the great demand for complete sets of the five monographs it was considered advisable to have them re-published under one cover.

BRITISH-AMERICAN NICKEL.

At a meeting of the Sudbury Board of Trade this month, Mr. J. A. Holmes said, according to the Sudbury Mining News, that he had seen Mr. Dunn, president of the British-America Nickel corporation, and has gone pretty fully into the power situation. The company figured on developing about 7,500 horse-power at Twin Chutes, which would be sufficient for mining and smelting operations only, but they had no power in sight for the refining end. The company preferred to refine at the Murray, providing they could get power at a reasonable figure. Mr. Holmes pointed out that when their operations closed down about two years ago the company had planned to bring power from French river, through the Hydro-Electric. The Dominion and Provincial governments were working together then. The company's engineers estimated at that time that power could be delivered in Sudbury at about \$9 per h.p.; in fact, Mr. J. R. Booth had offered to deliver all the power required at \$10 per h.p. The process to be used in refining was electrolytic, and it was essential to have cheap power, as to do the work planned it would require about 7,000 h.p. over and above that available at Twin Chutes. The company expected to handle 5,000 tons daily, which would be about double what the Canadian Copper Co. are treating at present. The British-America people did not wish to develop powers on their own account, and if Hydro-Electric would come in the company would hand over Twin Chutes. Neither did the company desire to house their employees, except the few whom it would be necessary to have at the mine all the time, but they preferred to have the others live in Sudbury. Mr. Holmes thought it looked like good business to get busy and try to get the refinery here, and the first step in this direction would be to get the town council to ask the Hydro-Electric to investigate. The refinery would be a big thing for the district if it could be landed, and it can be landed if Sudbury can induce Hydro. The refining

plant alone would cost perhaps \$1,500,000. There had been considerable discussion at the board on various occasions about securing industries, but it would take a good many to equal a refining plant.

Mr. O'Connor said he had had the pleasure of an interview with Mr. Dunn and Mr. E. R. Wood, of Toronto. The latter had stated that he had taken up the French river power project with Sir Adam Beck and Mr. Gaby, who had told him that it could not be delivered in Sudbury for less than \$25 per h.p. This amount was prohibitive, and unless some other than the French river was available, it was not worth while doing anything.

Mr. Holmes pointed out that the French river is only one of many available powers. The Ottawa river is full of powers, and the French river has two others in addition to the Chaudiere falls. The British-America Co.'s engineer had assured him that power could be delivered at not more than \$10, and that the pole line would be only 45 miles long. There was another power above High falls with a head of 22 ft., but he could not say offhand if it was available.

Mr. Black said that when he was in Toronto recently he saw Mr. Gaby and spent some time with him. They had gone over the power situation, and he found that Mr. Gaby was better posted than anyone here. He had all the necessary data and had informed him that the Hydro-Electric Commission would come to Sudbury if invited, but the invitation must come through Sudbury as a municipality. With reference to guarantee of bonds by Sudbury, Mr. Gaby said that Sudbury would only be responsible for power used in Sudbury. The Commission was prepared to make a survey and give a report on estimated cost without one dollar of expense to Sudbury. The town would only have to assume liability for 100 h.p., or they would even come for 50 h.p.; the power would cost \$20 or less, according to quantity taken.

INTERNATIONAL NICKEL CO.

New York, Sept. 23.—As a result of pressure on International Nickel Co. for nickel, the management has set aside \$5,500,000 from cash on hand for construction of a refinery in Canada and extension of its smelters and other facilities. All this money will be spent in Canada.

It has been realized by the directors that the present capacity of its plant is inadequate to meet the demands for nickel. Consequently, enlargement and new construction programme will be begun immediately and will be rushed.

This expenditure will eventually be capitalized and distributed to the common shareholders in a stock dividend, following the custom of the Nickel management. Capitalization of this investment would indicate that the stock dividend when authorized will amount to 10 per cent. or higher. The last previous distribution in stock was 10 per cent. last year.

A straw showing the demand for nickel is the fact that Midvale Steel has just placed a contract with the International Nickel Co. for 8,000,000 lb. to be delivered over a period. Early this year International Nickel received an order from the British Government for a very large tonnage of nickel to be delivered over 12 months.

In August the International Nickel Co. sold 7,600,000 lb. of nickel, or 1,500,000 lb. more than ever sold in any previous month. With such great demand the company has been unable to maintain the reserve supply which according to its policy it has kept on hand.

Buying of the stock in the last few weeks has been based on realization by investors of the great strength of the company's position. Unlike other metals, the price is not subject to wide fluctuations. The policy of the International Nickel Co. has been to encourage consumption by selling at a reasonably low price.

On the basis of dividends of 24 per cent., or \$6 a share, International Nickel, at present figures, yields better than 12 per cent. on the investment. It has been the history of the company that dividends are on a steadily rising scale despite the fact of stock distribution in the interim.—Boston News Bureau.

THE ARCTIC EXPEDITION.

Dr. R. M. Anderson, accompanied by Mrs. Anderson, arrived in Vancouver recently from Seattle on the steamer Sol Duc. The Colonist interviewed him and published the following:

Dr. Anderson was in charge of the southern party of the Canadian Arctic expedition under V. Stefansson, which left Victoria in June, 1913. He will leave shortly for Ottawa, where he will be engaged for the next six months or so in connection with matters pertaining to his northern research. Other members of the southern party who reached the city a few days ago are already on their way to the capital. F. Johansen, marine biologist and botanist, left the party at Ketchikan, Alaska, and went east over the Grand Trunk Pacific from Prince Rupert. The numerous specimens collected by the party are already on their way to Ottawa.

Dr. Anderson states that Mr. Kenneth G. Chipman, who was with the party and is attached to the permanent Dominion staff, spent seven years in British Columbia engaged on surveys. Mr. Chipman was engaged in extensive surveys on the south side of Coronation gulf, and came out with one of the members of the R. N. W. police patrol which went north this spring. They traveled to Great Bear lake and thence to Fort Norman, and he boarded one of the Hudson's Bay boats running up the McKenzie river.

The most interesting of the discoveries made by the party from an historical point of view was the cairn made out of rocks by Sir John Richardson at Cape Krusenstein during the latter's expedition of 1848 in company with Dr. Rae. No records of any kind were found in the cairn. As much detail as it is possible for Dr. Anderson to give to the public regarding their Arctic explorations has already been published.

Asked as to the nature of the country in which the explorer has spent the past three years, Dr. Anderson states that the whole northern coast gradually slopes down to the Arctic seas, the hills being only 200 to 300 ft. high, and there are no high, rugged mountains. The snow is usually all gone, except on the top of the hills, by the middle of June, and the freeze-up takes place about October 10th. In some cases it may freeze up a month earlier, but this would be very unusual. The time at which the sea freezes up depends largely on the amount of ice floating around outside, and as winter approaches the northwest winds bring this down to the coast.

The party intended to work the first winter at a point east of the McKenzie river, but they did not manage to make it. The year 1913 was a bad one for traveling and several ships were caught and frozen in between Point Barrow and Demarcation point, and failed to make their destination to Herschel island. One of the southern party's vessels was frozen in at Collinson point, Alaska, near the place where Captain Collinson wintered in about the year 1854. The party

was disappointed in not getting further in, but the topographical survey was finished in the spring of 1914 from Demarcation point, between Alaska and Yukon territory. Sledge parties went south and did this work at Firth river. In the late spring and summer they made a survey of the McKenzie delta, east and west branches. The delta is about 150 miles long and 50 to 75 miles wide at the outer edge.

In the summer of 1914 they succeeded in getting into Dolphin and Union straits at the west end of Coronation gulf, and in the fall of 1914 and spring of 1915 a survey was completed west from there to Cape Parry. This survey included quite a portion of the coastline that had never been mapped. They also mapped up one of the large rivers, unnamed, at Darnley bay.

In the spring of 1915 the party also surveyed the west end of Coronation gulf and the Rae river, which had never been explored to any extent before. This river was named after the famous explorer, Dr. Rae, who was very well known in connection with the Franklin expedition. In the summer of 1915 Mr. O'Neil, the geologist, and Mr. Cox surveyed the Tree river in Coronation gulf, south side. This is one of the large rivers east of the Copper Mine river. Late in the summer they took a 20-ft. gas launch and a large 30-ft. skin canoe, with motor attached, and surveyed the coast of Arctic sound, some distance up the Hood river, and a large part of Bathurst inlet, as far as the Kent peninsula, which was the eastern extremity of the work assigned to the southern party of the expedition.

Native Copper Deposits.

The principal object of this branch of the expedition was to make a geological investigation of this region with a view to ascertaining the extent of the copper-bearing rock. It has been known for some years that the district was rich in copper, as the Eskimos were discovered using knives, arrowheads, lances, spears, ice-picks, etc., made out of pure copper. The object of the party was to find out the real extent of the copper deposits.

Dr. Anderson states that he is not in a position to give out the exact known areas of this deposit, but they had made a careful estimate, which will be submitted at Ottawa. The copper is scattered fairly uniformly in fine grains through the rock, like pepper. The rock is a black diabase. Specimens, however, brought in by the Eskimos have consisted of pure copper weighing over 40 lb.

It is not anticipated by Dr. Anderson that there will be any necessity for their returning to the district in which they have been engaged, as the work for which they went north has been entirely finished.

THE HUDSON BAY RAILWAY.

"Work on the Hudson Bay railway is progressing very favorably," says Mr. W. J. Young, of the staff at Piquitena.

On Saturday, September 9th, steel had been laid as far as Mile 292, and by September 16th it will have reached 300. Kettle Rapids is some 30 miles further on, and by the first day of October that point will have been reached. Some difficulty has been experienced in obtaining sufficient labor for the pushing ahead of construction. A steady supply of rails is required also; those being laid down now having been gathered from sidings not required at present and from the road-bed leading to the terminals at The Pas Annex. Mr. Young says: "Given a fair show in labor and rail supplies, the Hudson Bay railway will positively be in the bay port one year hence."—The Pas Herald.

PHOSPHATE IN ALBERTA.

In a report on the discovery of phosphate in Alberta, Mr. H. S. de Schmid, of the Department of Mines, Ottawa, says:

There are in the Banff district four parallel, approximately north and south fault strips, in each of which is represented a certain thickness of Rocky Mountain quartzite, the uppermost member of the Upper Carboniferous or Pennsylvania formation.

Only in the two middle belts was the presence of a definite phosphate horizon established; in the western and eastern belts a considerable thickness of the upper quartzite beds (containing the phosphoria or phosphate bearing formation) is absent, having been either eroded, overridden or down-faulted.

The phosphate horizon occurs in the upper 50-60 feet of the Rocky Mountain quartzite, and is overlain by massive, grey harsh chert-quartzite. Below it follow beds of whitish or grey quartzite, often separated by thin, brown shaly partings, and these quartzites are underlain by black, dense chert. Many of the quartzites and shaly partings are phosphatic, but the only phosphatic horizon of any possible consequence is the main phosphate bed. The average thickness of this bed may be taken as 12 inches.

The phosphate is black in color, and is very dense and compact. It is fine grained and quite hard. Dark, purple fluorite is almost always present in some amount. The material of the bed consists variously of more or less pure, massive phosphate or of nodular masses of phosphate in a dark-grey quartzite matrix. The proportion of phosphate to silica in the latter case is distinctly variable at different localities.

The average dip of the phosphate bed and the enclosing quartzite series is 55 deg. west.

The highest phosphoric acid content obtained from samples taken across the entire bed was 27.63 per cent., equivalent to 60.37 per cent. bone phosphate.

The average of nine analyses of samples taken at four widely separated points and in two adjacent fault strips showed 20.0 per cent P_2O_5 or 43.7 per cent. $Ca_3(PO_4)_2$.

The highest content of ferric oxide was 2.71 per cent. and the average of 1.50 per cent., while the average iron and alumina combined amounted to 1.95 per cent. The iron and alumina content is thus well below the maximum of 3 per cent. required by superphosphate manufacturers.

There are at least two outcrops of the phosphate bed that are conveniently situated as regards accessibility and transportation facilities, the one being about 4 miles from Banff station and the other hardly more than a mile from the railroad.

While unsuited to the manufacture of superphosphate by the sulphuric acid method, owing to the low content of tricalcic phosphate (average of nine analyses from various outcrops, 43.7 per cent.) and to the large amount of silica present (average of nine analyses, 43.3 per cent.), the Alberta rock would possibly prove suitable for treatment by one of the thermic processes that have lately been proposed to supplant the sulphuric acid method.

Several of these processes are specially designed to employ low grade phosphate rock as raw material, the particular rock in view being impure, calcareous or clayey phosphates high in iron and alumina. None of the proposed methods, however, have as yet been proved commercial successes. With the advent of a commercial, thermic process, the natural gas resources of

Alberta may perhaps prove an important factor in the possibility of utilizing this low grade Alberta phosphate.

For purposes of comparison, it may be stated that the most northerly Montana phosphate so far reported on by officers of the United States Geological Survey (that of the Elliston district, near Helena), contains an average of 65 per cent. tricalcic phosphate, the bed ranging in thickness from 3 to 5 ft. These deposits are situated from 2 to 7 miles from the Northern Pacific railway, and are regarded as readily capable of development.

The distance in a direct line from the Elliston outcrops to those of the Banff district is approximately 350 miles, and to the International boundary 190 miles. Assuming, as seems probable, that the Banff bed is a northerly extension of the Montana deposits, we have a belt of about 160 miles in Canada, along which phosphate outcrops may possibly be met with. The extension of the phosphoria series to the north of Banff is not taken into account here.

PRICES IN CANADA, 1915.

The great rise in prices during the war, which became very steep after the middle of 1915, is shown in the report just issued by the Department of Labor, entitled "Wholesale Prices in Canada, 1915," which also contains information regarding retail prices and prices in other countries.

In Canada the wholesale prices of 272 commodities averaged over 8 per cent. higher than in 1914 and 9 per cent. higher than in 1913, while the retail prices of some 30 foods were 2 per cent. higher than in 1914 and 7 per cent. higher than in 1913, allowing for the importance of each article in family consumption. By December, 1915, however, the steep rise had brought the index number of wholesale prices to a point 20 per cent. higher than in July, 1914, while retail food prices had risen 10 per cent. during the same period.

The index number of wholesale prices stood at 148.0 for the year as compared with 136.1 for 1914, and 135.5 for 1913, but by December, 1915, had reached 161.1 as compared with 134.6 for July, 1914. A weekly family budget of food averaged \$7.86 for 1915, \$7.73 for 1914, and \$7.33 for 1913, but for December, 1915, stood at \$8.13 as compared with \$7.42 in July, 1914.

It may be noted that the rise in prices has continued during the current year, as shown from month to month in the Labor Gazette. The index number of wholesale prices reached 180.9 for May, but declined slightly thereafter, metals, chemicals and certain materials being lower. In retail food prices the weekly budget reached \$8.63 for August, there being a decline only in July, when midsummer conditions lowered prices very slightly.

In other countries retail food prices also rose steeply, the rise from the beginning of the war to the end of 1915 being calculated as high as 113 per cent. for Austria, 83 per cent. for Germany, over 30 per cent. in the Netherlands, Norway and Italy, and 44 per cent. in Great Britain. In Australia the rise was nearly 30 per cent., as a result of drought, while in New Zealand it was only 16 per cent. In Japan, prices were lower than in 1914 and 1913.

"The results of the great rises were considerable increases in the cost of living, particularly in the expenditure on foods. In clothing, house furnishings, etc., stocks in the hands of manufacturers and dealers were often sufficient to prevent great rises for some time, even a year or more, but in food increases were immediately felt. At the beginning of 1915 staple foods

were substantially higher than before the war, though in many cases somewhat lower than the high levels reached during the few weeks of uncertainty and speculation which followed its outbreak."

The report shows that the rising prices were accompanied by increased activity in industry and trade. "Not only did the needs for the prosecution of the war make necessary increased production in many lines and new production in goods never before attempted or thought of, but production was renewed in many lines and in many districts abandoned previously owing to the poor returns normally obtainable. These changes again had great influence in stimulating other branches of industry and trade, causing higher prices. This reaction was soon experienced in many lines at first depressed by war conditions. In Canada, wheat, oats, flour, cheese, butter, packed meats, pulp and paper first felt the stimulation of increased demand due to war conditions, but these were soon followed by wool, fish, leather, zinc, copper, chemicals, New Brunswick lumber, linseed oil, and later iron and steel, as well as most metals and metal products. In the latter part of 1915 the upward movement was particularly strong in metals, chemicals and wool, while in jute, silk, rubber, etc., among imported materials, the rise was marked."

VENUS MINE, SOUTHERN YUKON.

Prospects are reported to be bright for what are known as the Conrad mining properties situated in the neighborhood of Windy Arm, Southern Yukon. Included in some notes published by the Daily Alaskan, Skagway, Alaska, after a recent visit to that place of Mr. J. E. McFarland, superintendent at the Venus mine, were the following particulars:

Returns from shipments of ore made from the mine have been most promising to the operators. Under present working conditions, ore will be shipped at least every fortnight. The steamer Ena, which left Skagway lately, took south a fair-sized shipment of ore. Stopes are being worked both above and below the main level of the Venus mine, which level has been driven about 2,000 ft.

The plans of the operators call for the installation of modern machinery and the adoption of the latest methods in mining and handling the ore. Heretofore ore has been sacked for shipment, but to save time and ensure dispatch in getting it away, it will be shipped in bulk in future.

METALLURGICAL RESEARCH.

The Government Research Council, London, having made a grant of £1,000 per annum towards the cost of carrying on the research inaugurated by the Institute of Metals Corrosion Committee into the causes of the corrosion of marine condenser tubes, it has been found possible by the Corrosion Research committee, which has recently been re-constituted so as to include representatives of all bodies interested in the subject, greatly to extend their sphere of activities. Two salaried investigators have been appointed in the persons of Captain G. D. Bengough, D.Sc., and Dr. O. F. Hudson. They will conduct scientific researches on the committee's condenser plant now about to be installed by the courtesy of the Brighton corporation, in the Brighton Electricity Works. The plant will be worked under ordinary industrial conditions, the microscopical and other examination of the metal treated at Brighton being carried out in the metallurgical laboratories of the Imperial College of Science and Technology, South Kensington.

THE HERB LAKE GOLD DISTRICT, MANITOBA*

By R. C. Wallace.

Herb lake, near the eastern end of the belt, may be reached either from the Hudson Bay Railway line from The Pas, or by canoe from Athapapuskow lake. The latter route, though longer, is more interesting, by reason of the fact that it traverses practically the whole mineral-bearing area. From the east end of Athapapuskow lake a portage is made to the Cranberry lakes at the head waters of the Grassy river. This river is followed down through Elbow lake, Island lake, Reed lake and Sandy lake, into Herb lake. The route is a well-travelled one, and the time required is five days from the steamboat landing at the mouth of the Sturgeon river. Herb lake may be reached from the railway line most conveniently, either from Mile 86 or Mile 137. From Mile 86 a portage of 14 miles leads direct into the south end of Herb lake. This route is, however, a difficult one for the transportation of canoes or heavy packs. A longer, but more feasible, route is from Mile 137, portaging through to Setting lake, thence up the Grassy river, through Pakwahlgan lake into Herb lake, the journey taking altogether about three days.

The first mineral discoveries in that part of the belt which lies within the province of Manitoba were made on Herb lake, where gold was found in a quartz vein on the Kiski Wekusko property. Since that time several veins have been discovered on the east side of Herb lake. Staking has also been done on the south side of Island lake, on Little Herb lake and on Thicket Portage. In the principal district—the east side and northeast end of Herb lake—the veins occur in a sheared sediment or in a basic volcanic which borders the sediment on the side. The strike is north, or somewhat east of north, and the dip uniformly towards the east. The quartz veins are lenticular, in places 10 to 12 ft. wide, narrowing down to stringers or even disappearing, and again widening when followed along the shear zone. The heaviest veins occur in the Rex group and the Kiski-Wekusko property, the average width being somewhat over three feet. The characteristic mineralization is arsenopyrite, which occurs practically solid in the walls and disseminated in stringers in the veins. Copper pyrites, zincblende and galena are found sparingly, and the gold occurs in good showings in a white saccharoidal quartz. Though the walls are highly impregnated with sulphide, the veins are only sparingly mineralized. Tourmaline is almost invariably present.

On the Kiski-Wekusko property two main veins have been stripped continuously for 500 ft. and 700 ft. respectively, while the single vein on the Rex property has been followed approximately 1,900 ft. These distances do not represent all quartz veins, but well-defined shear lines, more or less continuously filled with quartz. Frequently also small stringers, no doubt connected with the main veins, have invaded the country rocks, and may be traced considerable distances from the main body.

Nearer the contact with the granite, which lies west of the sedimentary band, the veins are more irregular in length and in width, but show good surface values in gold. The Ginger claim and the Molybdenite property, at the north end of Crowduck bay, are in the granite. The situation is reported to be similar at Little Herb

lake, while McCafferty's lens-shaped vein is practically on a contact zone.

A line of claims has been staked in greenstone on the south of the Island lake as a result of the discovery of very rich float rock on the shore of the lake. The vein from which the float has been broken off has not yet been found.

Mica occurs in fairly large flakes in pegmatitic veins on the west side of Crowduck bay, and a quartz vein on the Grassy river, immediately below Crowduck bay, contains good showings of molybdenite. Magnetite is reported from an eastern part of the area, but the occurrence was not visited.

Though no sinking has been done on the quartz veins on Herb lake, they have been very thoroughly stripped, even where the overburden is quite heavy, and careful surface sampling is now possible throughout the length of the more important veins.

The discovery of the sulphides has attracted the active interest of several American mining corporations of standing, which augurs well for the future development of mining in the district. It has not yet, however, attracted a sufficiently large number of prospectors. The greater part of the belt is absolutely unprospected. When the extent of the mineral belt is realized, and when it is known that it is entirely probable that only a small number of the sulphide bodies—and perhaps also of the gold-bearing quartz veins—have yet been discovered, the prospector will, under happier post-bellum conditions, undoubtedly find his way into the district.

PLUNGING INTO PEACE.

Rebounding from two years and more of the most destructive and wasteful war in history, the world will plunge into a trade and economic contest in which forces will assume totally new alignments, when competition will be keener and stronger than ever, and when science and organization will play a leading part in any successful role. For this struggle Canada must gird up her loins and make ready her full equipment of preparedness. She has the advantage over many other countries in richness and abundance of resources, in geographical world position, in vigor of race and in robustness of intellectual and moral fibre, while hope, verging on pronounced optimism, is an abiding and stimulating force with our people.

"I doubt, however, if we yet sense adequately the unnatural situation in which we have become involved, or the wrench and strain that will accompany the resumption of our natural and normal position."

"The question which it seems to me each should face is this: 'What will be the situation as regards our industry in Canada when the war ends and how can we best meet it?'"—The Right. Hon. Sir George Foster, in his Call to Action.

FIELD TELEPHONE CABLE.

The Standard Underground Cable Co. of Canada, Limited, Hamilton, Ont., is at work on a large order of field telephone cable. The extensive use made of electricity on a modern battle field for signalling to, and otherwise communicating with, widely scattered bodies of troops, renders electrical conductors a vital factor in the handling of armies, and the frequent destruction and rapid deterioration of such systems of conductors in this service necessitates an enormous and continuous supply. A large order for seamless copper tubes to be used as shrapnel bands has also recently been received.

*From a report made for the Public Utilities Commission, Manitoba.

ONTARIO'S METAL PRODUCTION

Returns of production for the first six months of 1916, made to the Ontario Bureau of Mines by the metalliferous mines and works of the province, are summarized in the following table, which also gives comparative quantities and values for the corresponding period of 1915.

	1915.	1916.	1915.	1916.
	Quantity.		Value.	
Gold, oz.	173,021	235,060	3,570,072	4,822,740
Silver, oz.	11,101,909	10,267,743	5,188,763	6,188,269
Copper, lb.	77,795	121,817	14,368	103,677
Cobalt (metallic), lb. ....	.....	13,933	.....	5,899
Nickel (metallic), lb. ....	.....	.....	.....	13,075
Molybdenite (concentrates), lb. ....	.....	12,631	.....	13,075
Cobalt and nickel oxides, lb.	141,500	401,408	56,312	204,638
Copper in matte, tons.	8,523	11,426½	1,794,600	2,285,096
Nickel in matte, tons.	15,182	20,651½	7,591,000	10,325,766
Iron ore, tons.	134,077	80,650	288,296	243,268
Pig iron, tons.	225,940	295,349	2,856,040	4,424,496

The production for the six months ending June 30th, 1916, shows a material increase in value of all metals over that for the first six months of 1915, with the single exception of iron ore.

Gold.

If the present rate of production is maintained Ontario should reach the \$10,000,000 mark for 1916, as compared with \$8,500,000 for 1915. Of the total yield the Porcupine camp contributed all with the exception of \$545,434 produced by the Croesus in Munro township, the Rognon near Dryden, the Tough-Oakes at Kirkland Lake and the Canadian Exploration Co. at Long Lake, near Sudbury. The Hollinger Consolidated and Dome Mines are the big producers of the Porcupine camp. Before the year is out Boston Creek will probably be contributing to Ontario's gold production. Development is proceeding on some of the more promising claims at Kowkash, situated east of Lake Nipigon on the Transcontinental Railway.

Silver.

Since the beginning of 1916 the price of silver has advanced considerably, the average being 62½¢ per oz., low 56½¢ and high 77¼¢. As a result production has been stimulated, and the value as compared with 1915 figures shows a considerable increase. Although the ounces sold were less than for the corresponding six months' period of 1915, the total production was greater, over 1,000,000 oz. remaining to be marketed. Undoubtedly the life of the Cobalt camp will be prolonged as the result of introducing flotation treatment for handling low grade dumps and slimes. Nipissing still leads in output with a valuation of \$1,766,561. The Mining Corporation of Canada (Cobalt Lake and Townsite City) is the next large producer, followed by Kerr Lake, Coniagas, McKinley-Darragh-Savage, Seneca-Superior, etc., in the order named.

Cobalt.

With the outbreak of war the European market for cobalt oxide was suddenly cut off. However, new markets and new uses for metallic cobalt have improved the situation. High grade steels are now produced from cobalt alloys. Metallic cobalt production is greatly in excess of last year.

Nickel.

Metallic nickel from Cobalt district ores is produced at the refining works of the Deloro Smelting and Reduction Co., Limited, formerly known as the Deloro Mining and Reduction Co. The output shows an increase over the 1915 production, which was not marketed during the six months' period.

Copper.

Apart from the nickel-copper deposits of Sudbury, there has been a revival of copper ore mining in Ontario, partly due to the high price of the metal. The old Tip-Top mine and other properties near Mine Centre, in the district of Rainy River, are now producing. The Rand Syndicate is operating near Timagami. The Sable River Copper Co. at Massey, has erected a mill and is using the flotation process for the treatment of copper ore.

Nickel-Copper Matte.

The smelters of the Canadian Copper Co., at Copper Cliff, and the Mond Nickel Co. at Coniston, are turning out nickel-copper matte at an unprecedented rate. The production, as compared with the first six months of 1915, shows an increase of nearly 40 per cent. The valuation of the metallic contents of the matte has been made on a basis of 10 cents per lb. for copper and 25 cents for nickel. The figures given for metallic copper and nickel separately show that the prices were over 18 and 42 cents per lb., respectively.

In addition to the above mentioned companies, the Alexo mine, near Porquis Junction, produces a small amount of nickel-copper ore, which is treated at the Coniston smelter.

Molybdenite.

This mineral occurs widely in Ontario, but is mined chiefly in Renfrew county. It is wanted at the present time for use in the manufacture of high-speed tool steel, and for this purpose molybdenum will probably replace tungsten to some extent. The demand for molybdenum steel, to be used in munition factories, comes largely from the allied nations, Britain, France and Russia. Molybdenite concentrates, containing 85 per cent. or more of MoS₂ are worth about one dollar per lb. Ferro-molybdenum is now (September) being manufactured for the first time in Canada by the Orillia Molybdenum Co. at Orillia, and the Tivani Electric Steel Co. at Belleville.

Iron Ore and Pig Iron.

The only shipments of iron ore were from the Magpie mine, operated by the Algoma Steel Corporation at Sault Ste. Marie. Although iron ore production shows a decrease as compared with the same period in 1915, that of pig iron shows a material increase, both in tonnage and value.

HOLLINGER.

Every effort is being made to shorten the time which must elapse before Hollinger can make the increase in production necessary to fulfil the plans of the directors. Since the merger with Acme the distribution to shareholders has been increased to such an extent that the big surplus is being used up. With the new mill completed, production will be large enough to warrant the present rate of dividends and at the same time build up a surplus.

The foundation for the addition to the mill has been completed, and the stamps should be dropping next spring. By that time the new central shaft should be ready for operation.

SULPHIDE DEPOSITS AT FLIN-FLON AND SCHIST LAKES, MANITOBA

Prof. R. C. Wallace, of the University of Manitoba, accompanied by J. S. DeLury, lecturer in geology at the same institution, returned recently from a short examination of the copper and gold deposits of northern Manitoba. His description of the geological conditions will be read with interest by hundreds both in Canada and the United States who have never visited the region, but whose attention has been directed to it through the many promising discoveries that have already been made. It will be noticed that Prof. Wallace does not indicate either the results of sampling of the ore bodies nor the depth to which the ore has been proved. These very important details he was not at liberty to reveal until certain negotiations at present being conducted shall have ended. Prof. Wallace says of a brief investigation of the Flin-Flon lake eastwards to Setting lake:

At the northern edge of the limestone a band of Keewatin and Huronian rocks extends eastwards from Beaver lake almost uninterruptedly to a point on the Grassy river, 15 miles east of Herb lake. The belt is approximately 120 miles long, and of very irregular width. The average width is probably 15 miles long. With the exception of the western margin of this belt, from Beaver lake to Flin-Flon lake (a distance of 15 miles), the area lies in the province of Manitoba. The centre of the belt is 60 miles north of the town of The Pas, which is the natural point of communication with the district. In the eastern part of the belt, the Hudson Bay railway has been of service in opening up the country, and in stimulating prospecting, as contact may be made with the belt at several points on the line.

The greatest interest has been shown in the discoveries of sulphide at Flin-Flon and Schist lakes. To reach these points, part of the journey from The Pas is made by means of the Ross Navigation Co.'s steamboat up the Saskatchewan river, via Cumberland House, through Cumberland and Sturgeon lakes to the mouth of the Sturgeon river. From this point the canoe route leads up the Goose river through Goose lake. From Athapupuskow lake there is an all-water route into Schist lake, and two portages from Schist lake into Flin-Flon lake.

The wagon road to be constructed by the provincial government from Sturgeon lake to Athapupuskow lake will very materially lessen the distance and the cost of transportation by obviating the necessity of travelling on Goose river and Goose creek. An alternative, though somewhat more difficult route, into Flin-Flon lake, is by wagon road from Beaver landing on Sturgeon lake (a point of call for the Ross Navigation Co.'s steamboat) to Beaver lake, and from Beaver lake either by the Copper lake or the Sucker creek route.

Through the work of Mr. Tyrrell and Mr. McInnes, of the Geological Survey of Canada, the Keewatin-Huronian belt north of The Pas was delineated, and the possibility of mineral deposits was indicated, before actual discoveries were made. Since the discovery of gold at Beaver lake, Dr. Bruce, of the Geological Survey of Canada, has spent three seasons in the district, preparing a map which will define the geological relationships, and will cover a large amount of ground hitherto unmapped.

Three geological phases are represented in the district: (1) The outpouring of lavas, mainly basic, but in part acidic, occurring as massive and ellipsoidal basalts, sheared greenstones, and sericitic quartz porphyries;

(2) the deposition of sediment on these lavas, shown as fresh and sheared conglomerates, with pebbles of granite, quartz and jasper, and very commonly as sheared quartz, etc., which have developed into sericitic schists, hardly to be distinguished from the acid igneous eruptives; (3) the intrusion of masses of granite which flank the whole belt on the north side. The granite is frequently dark grey near the contact, but usually pinkish farther from the rocks, which it intrudes. To this granite, or to certain outcrops of this granite, are to be ascribed the sulphide bodies and the mineralization of the quartz veins. While the sulphide bodies and, with few exceptions, the mineralized quartz veins, occur not in the granite, but in the basic eruptives or the sediments, the presence of isolated crystals of arsenopyrite—a mineral characteristic of the mineralization of the district as a whole—in the massive granite, is significant of the origin of the ore deposits. Some staking has been on quartz veins in the granite, but practically all the discoveries made up to date are on the northern edge of the eruptives and sediments in close proximity to the granite. This granite has not only mineralized the rock which it intruded, but has in places changed it to a very marked degree. This is best illustrated at the northeast end of Herb lake, where a fine-grained sediment has been metamorphosed into a coarse staurolite schist, which grades off on the farther side from the granite into a garnetiferous schist.

Southwards, the belt disappears underneath a reddish limestone formation which was deposited much later than the youngest of the rocks hitherto described. There is consequently no "contact" with the limestone in the sense in which the term is understood by the prospector, and consequently no foundation for the somewhat widespread belief that the edge of the limestone should be good prospecting ground. In one sense, however, the limestone has been of undoubted economic importance. It has, to a large extent, protected the comparatively soft Keewatin-Huronian belt with its ore deposits from preglacial and glacial erosion. But for the protective capping of the limestone, which extended much farther north than its present limits, the whole belt would have been completely eroded away.

Two types of ore deposits occur most prominently in the district: (a) Sulphide ore bodies; (b) gold quartz veins. The characteristics are distinctive, and the types may be conveniently discussed independently.

The Sulphide Deposits.

Widespread interest has been taken in the district since the discovery was made last autumn of large bodies of mixed sulphides on the east side of Flin-Flon lake. Subsequently a similar ore body was found on the west side of the middle arm of Schist lake, and more recently sulphides have been discovered on Athapupuskow lake, Copper lake and Sandy lake. As a rule, the sulphides occur in intermediate volcanic rocks in close proximity to the younger granite. They have been formed as replacement deposits in zones of weakness, along fault planes or planes of brecciation. The petrological character of the replaced rocks seems to have been of less significance than the brecciation, as in practically all the ore bodies examined, unmineralized horses of similar rock to that replaced occur in the ore bodies—the rock of the horse not having been affected by the shearing. No quartz accompanies the ore bodies.

Up to date sulphide bodies have proved to be of considerable economic importance. They are located respectively on the south-east end of Flin-Flon lake and on the west side of the middle arm of Schist lake. Both

properties have been cross-trenched to expose the unweathered ore and the deposits have been prospected by diamond drilling.

Owing to business negotiations pending on the properties the results obtained by diamond drilling are not available for publication; consequently attention is here confined to the surface evidences. The replacement ores are sulphides of copper, zinc, iron, lead, arsenic, with gold, chalcopyrite, zincblende, pyrite, arsenopyrite, galena, more rarely pyrrhotite, with oxidation products, chalcantite and covellite. The massive ore at the centre of the deposits is mainly copper pyrites, banded with zincblende. Towards the margins, copper sulphide gives place to pyrite, which grades insensibly into unmineralized schist. At Flin-Flon lake the ore body strikes slightly west of north, and dips steeply eastwards. The maximum surface measurements of the mineralized zone may be taken as 1,900 ft. in length, and 200 ft. in width, the ore appearing on two points on the east of the lake, covered in part by a small bay between these points, and broken by a large mass of unmineralized rock. The measurements consequently include a good deal of country which is not strictly on surface showings ore body. At Schist lake a very compact deposit is well shown by trenching, with a similar strike and dip to that at Flin-Flon lake. This body is 420 ft. long and 75 ft. wide (maximum measurements) at the surface, with almost solid mass of chalcopyrite and zincblende—25 ft. wide—in the centre, the sulphides grading into pyrite on both sides. There are distinct evidences of shearing and brecciation in the zone in which the ore body has been deposited, and the zincblende has probably been introduced subsequent to movements which have affected the copper sulphides.

An interesting and important feature in connection with these and other sulphide bodies in the district is the extensive weathering of the surface ore. The oxidation is unusually pronounced for a highly glaciated country; even at the bottom of trenches 10 ft. deep the evidences of weathering are general. Where the sulphides are exposed at the surface, they are coated with a red rust, which serves as an indication to the prospector; but owing to the fact that the sulphides have formed in zones of weakness, they have, as a rule, been weathered to a lower level than the surrounding country rock, and are now to be found in the valleys covered by glacial drift, or even by the waters of the lakes. For this reason, only a very thorough prospecting will reveal all the sulphide deposits.

At Sandy lake, immediately west of Herb lake, a fairly extensive sulphide zone has been found near the east end of the lake, practically on the granite contact. Iron sulphide (pyrite and some pyrrhotite), with traces of copper sulphides, occur disseminated through a soft carbonaceous schist.

Sulphide bodies are also reported from Copper lake, Athapapuskow lake and the Pineroot river. While certain of these deposits may be of little economic value, their wide distribution throughout the belt is an encouraging feature, which will undoubtedly stimulate intensive prospecting for copper-zinc sulphides, such as are being developed at Flin-Flon and Schist lakes.

ARCTIC COPPER DEPOSITS.

Seattle, Wash., Sept. 14.—Dr. R. M. Anderson has brought back to the United States some data which may prove of value to the copper mining industry. This information he secured in the Arctic region where he commanded a part of the Stefansson expedition. A full report will be made to the Canadian government

which financed the trip. Outlining briefly his copper discoveries, Dr. Anderson said:

"We were instructed to survey the copper deposits already known and seek new ones. Every explorer from the earliest times has noted that the Eskimos east of the Mackenzie used knives, spearheads and other weapons and utensils hammered from copper, and the Coppermine river, which empties into the Arctic, got its name from mineral discovered many years ago. We found on Coronation gulf and Bathurst inlet vast deposits of copper of low grade. We were not equipped to undertake mining operations, but upon the sides of cliffs we could measure the depth of successive flows of amygdaloidal lava containing nuggets of copper. An Eskimo brought to us a lump of copper weighing 40 lb. There were seams in the lava that had been filled with pure copper. Our geologist took many samples of rock, which will be assayed. He also made many estimates of the area of ore in sight.

"The ore had many of the characteristics of the Lake Superior copper rock. It is workable from the surface, and is near navigable water. It would be feasible to construct a railroad from the Mackenzie river, which is navigable five months of the year, to Great Bear lake, which also is navigable much of the year. A further railroad line could be built from the lake to the copper fields, enabling the transportation of the ore."

STANDARD SILVER-LEAD MINING CO.

Information relative to the operations of the Standard Silver-Lead Mining Co. during July, as under, was published on September 12, in Spokane Washington, the head office of the company being in that city:

The company's net operating profit for the month of July was \$56,609, as compared with \$30,398 for June, \$38,437 for May, \$86,774 for April and \$136,943 for March, which was the banner month for the current year. The company's surplus on July 31 was \$296,381, as compared with \$289,772 on June 30, \$309,373 on May 31, \$320,937 on April 30, \$284,163 on March 31 and \$197,220 on February 29. The dividend disbursements have been \$50,000 monthly throughout the year to date.

The company's income is derived from the production and sale of silver-lead and zinc ore and concentrates, much the larger part of its earnings being from its silver-lead products. During July 429 tons of silver-lead ore and concentrate was marketed, as compared with 497 tons in June, 504 tons in May, 729 tons in April and 1,295 tons in March. The statements of ore receipts at the smelting works at Trail, B.C., for the month of August show that deliveries there of silver-lead products by the Standard Co. totalled 763 tons, forecasting a more profitable showing than that of any other month this year, with the exception of that of March.

Recent monthly receipts from the sale of zinc ore and concentrate were as follows: March, \$5,432; April, \$26,847; May, \$18,260; June, \$24,808; July, \$63,890. The notably larger income from zinc during July was due to the fact that back settlements for a considerable period were made during the month, but not to any considerable increase in the quantity of zinc product marketed during July, the zinc shipments having still been limited to the 500 tons monthly called for under the company's contract with Beer, Sondheimer & Co. Contracts for the accumulated zinc products and for the quantity produced in excess of 500 tons monthly are still the subject of negotiations with the representatives of several zinc smelters.

The following is a summary of the company's financial statement for July:

Receipts.	
Preliminary settlements for 429 tons of silver-lead ore and concentrates.....	\$47,775
Zinc sales, including back settlements	63,890
Umpires.....	211
Boarding house	4,696
Total.....	\$116,572
Less, final settlements for May, and zinc penalties for February and March.....	17,028
Net receipts	\$99,544
Disbursements.	
Ore production, including mining, tramming, milling, shipping, marketing, power, general expense, salaries, taxes, etc..	\$28,521
Boarding house	3,607
Development.....	3,591
Construction.....	3,628
Aylard tunnel	1,812
Store supplies	872
Home office expenses	904
Total disbursements	\$42,935
Balance.....	56,609
Net operating profit	\$99,544
Cash Statement.	
Balance on hand, June 30	\$289,772
Net profit for July	56,609
Total.....	\$346,381
Less Dividend No. 44	50,000
Balance, July 31	\$296,381
Recapitulation.	
Cash in banks	\$219,209
Ore shipped but not settled for.....	122,678
Total.....	\$341,887
Vouchers payable and payroll	45,506
Balance, July 31	\$296,381

Metallurgical and Chemical Engineering, of New York city, has been publishing information concerning electro-chemical possibilities on the Pacific Coast as compared with those in Sweden and Norway, and reference was made to the new electrothermal iron reduction which has been developed on a very large scale in Sweden. Writing from London, England, a correspondent contributed to the September 1st issue of that journal some interesting details relative to the situation in Sweden in that connection. Beside giving information, as just stated, the correspondent made this observation: "I venture to say that there is no place in the world where conditions are so exceptionally suitable for electric iron ore reduction as the Pacific Coast of the United States and Canada. If enterprising people went about this affair in a proper way, it should be extremely remunerative and help to develop industry generally." Further comment was to the effect that electric refining of steel has gained much ground in Great Britain during the war, some 40 furnaces having been put in and success had everywhere been conspicuous. A final remark was that "any large electrothermic iron works on the Pacific Coast would be complete only with final electric refining."

AMERICAN INSTITUTE OF MINING ENGINEERS, ARIZONA MEETING.

Smelting and Leaching.

Douglas, Ariz., Sept. 19.—The first of the technical sessions of the convention of the American Institute of Mining Engineers, which is meeting in Arizona this week, were held here to-day on the general subjects of "Smelting" and "Leaching." Before the opening of these sessions the several hundred attending members, who are traveling through the State by special train, visited the reduction works of Copper Queen Consolidated Mining Co. and of Calumet & Arizona Mining Co.

A. G. McGregor, of Warren, Ariz., in an address on the "New Copper Smelting Plants in Arizona," told the engineers that in Arizona during the past five years there has been more activity in copper-smelting plant construction than in the same length of time in the history of the world. Mr. McGregor said that in this period five new copper-smelting plants had been constructed and put into operation. The monthly output from these plants, he said, averaged from 5,000,000 to 18,000,000 lb. He then described new problems which had been met successfully and new features in plant design and equipment which had been developed.

At the evening session on "Leaching," Frederick Laist and Harold W. Aldrich described the 2,000-ton leaching plant at Anaconda, Mont. A paper on "Possibilities in the Wet Treatment of Copper Concentrates" was read by Lawrence Addicks, and "Leaching Tests at New Cornelia" were discussed by H. W. Morse and H. A. Tobbelmann. In the course of the day's proceedings John C. Greenway welcomed the members to Arizona, and L. D. Ricketts, president of the Institute, responded for the delegates.

The party left to-night for Bisbee, where to-morrow's sessions will be held. Mining and Geology will be the subjects to be taken up in the technical discussions.

The Manganese Shortage.

Bisbee, Ariz., Sept. 20.—A further handicapping of the chemical industries and the paint and dye manufacturing interests of the country, due to a lack of manganese ores, was predicted here to-day during convention sessions of the American Institute of Mining Engineers, which is meeting in Arizona throughout this week. This statement was contained in a paper by E. C. Harder, of the U. S. Geological Survey, presented to the Institute members for discussion.

Mr. Harder's treatise explained that even at the beginning of the European war there had been a great decrease in imports of both ores and alloys of manganese, and that since 1914 the price had risen from \$37 per ton to \$100 per ton, with ferro-manganese selling considerably higher.

Said Mr. Harder: "The situation in the United States, at the present time, regarding the supply of manganese ores and alloys of manganese is one of great seriousness and is likely to become increasingly so while the European war continues. The dependence of the country upon foreign countries for this supply is being forcibly indicated."

Another feature of the sessions was the statement in a paper by David B. Reger, of the West Virginia Geological Survey, to the effect that "the exhaustion of oil and gas in the United States is proceeding at a rapid pace." Mr. Reger predicted that this problem will first be partially solved by the securing of deeper producing horizons in the high-grade oil regions and later by the possibility of mining deep sand oil and gas.

Other papers attracting considerable attention of the delegates were "The Geology of the Warren Mining District," by Y. Bontillas, J. B. Tenney and Leon Feuchere; "Co-operative Effort in Mining," by Joseph P. Hodgson, and "Gold and Silver Deposits in North and South America," by Waldemar Lindgren.

In this last paper Dr. Lindgren stated the conclusion that the South American mineral resources in precious metals are less than those of the northern continent, and that "even progress and enterprise will be unable to raise its production to approach the figures attained by North America."

The several hundred Institute delegates left here to-night for Globe, where Thursday's and Friday's sessions will be held.

The Future of the Flotation Process.

Globe, Ariz., Sept. 21.—Possible means of developing the flotation process to the greater benefit of the country's mining interests were taken up in the sessions of the American Mining Institute of Engineers, meeting here to-day.

Conclusions reached by the delegates, who include representatives of twenty of the leading metal producing companies of the country, were to the effect that the flotation process is now in its infancy, and that with the further discovery of new flotative agents and generous expenditures, a brilliant future record could be obtained for this process.

During a part of to-day the mining experts visited the mines of Old Dominion Copper Co. and later visited the reduction works of this company. During the evening technical sessions were held on the subject of "Fine Grinding," in which F. C. Blickensderfer, of the Detroit Copper Mining Co., described a comparative test of the Marathon, Chilian and Hardinge mills.

To-day's flotation discussions were particularly important to mining interests because of the first public presentation of a report of experiments on several miscellaneous wood oils which seem adaptable to use in the flotation process. A statement of some of the values of these oils was presented by R. C. Palmer, of Madison, Wis.; Glenn L. Allen, of the Shattuck Arizona Copper Co., and O. C. Ralston, of the U. S. Bureau of Mines.

Another especially striking feature of this discussion was a description by Dr. Rudolf Gahl, representing Inspiration Consolidated Copper Co., of the exhaustive research and experiment of his company in an effort to develop the flotation process. Said Dr. Gahl: "The flotation process is in its infancy. In what direction future changes may take place is perhaps indicated by tests which have been made partly on a laboratory scale and partly on a somewhat larger scale. The fact that the Inspiration Company has been able to design a commercially successful flotation plant must be attributed to the policy of spending great sums of money for the purpose of investigating the flotation process on a commercial scale."

Predicts Gasoline Shortage on Pacific Coast.

Globe, Ariz., Sept. 22.—A serious gasoline shortage on the Pacific Coast, the effect of which would extend throughout the entire country during the next year, was predicted here to-day during the closing sessions of the 113th meeting of the American Institute of Mining Engineers, assembled in Arizona throughout this week.

W. R. Hamilton, of San Francisco, presented the gasoline industry data to the engineers. According to Mr. Hamilton, the only possible means of increasing gasoline production are by increased production of

either light oil or casing-head gasoline, lowering the grade of market gasoline, or by successful innovations in refining methods. Most of these solutions Mr. Hamilton explained as impracticable in the immediate future, although stating that, by lowering the grade, production could be increased 30 to 50 per cent. He attributed the future gasoline shortage to decreased production of refinable oil (the decrease amounting to 6,000,000 barrels in 1915), steadily increasing consumption, the discontinuance of imports and the heavy exports due to the war demands.

Chemistry and Coal Mining.

During the course of to-day's meeting the mining engineers heard the value of chemistry to the coal mining industry, in a paper by Edwin M. Chance. Mr. Chance's conclusions showed that Americans have in the past been purchasing coal on its looks rather than because of its heating power. He made public results of experiments which showed dull appearing coal to have better heating and burning properties than the bright coals which have formerly demanded premiums in the market. It is said that this discovery will greatly help to offset the cost of coal production without materially increasing the costs to the consumer.

Other noteworthy papers to be presented were "Mine Fire Methods Employed by the United Verde Copper Co.," by Robert E. Tally, and "Stoping Methods of Miami Copper Co.," by David B. Scott.

To-morrow the engineers will leave Globe in a fleet of 100 automobiles for a day's tour of the Apache Trail and an inspection of the Roosevelt dam, probably the greatest engineering feat of its kind in the world. The trip will be resumed by special train at Phoenix to-morrow night, and Sunday will be spent at Grand Canyon. Since its start from New York City on September 14th the eastern party has visited practically every important mining centre of the Southwest.

POTASH FROM SILICATES.

W. C. Phalen in a report on potash, published by the U. S. Geological Survey, says:

The subject of the extraction of soluble potash salts from the silicates, such as feldspar, leucite and sericite, and from greensand has been discussed ever since the question of a domestic supply of potash was broached. Many patents for such processes have been issued, but the problem of doing the work at a profit is still to be solved. One difficulty is the location of large deposits of uniformly high grade material. Large deposits of feldspar of uniformly high grades are not plentiful. Of leucite and greensand there is abundance; and the supplies of greensand especially are very accessible. Whether the greensand will prove to be of sufficiently high grade or whether it can be brought up to workable grade is not known.

All processes for extracting potash salts from the silicates include both the mining and transportation of raw material, and also the accessory materials needed for the reactions. Further, in the practical manipulation of all the processes devised, there is generally involved fusion, sublimation, extraction, filtration, concentration, crystallization, drying, grinding, sorting and bagging, a series of operations which will make potash so expensive that under normal trade conditions it can never hope to compete successfully with German potash salts at the prices at which they can be sold in this country.

W. H. Bowker has said that: "The (German) potash industry has been one of the most profitable in the world. It is said that muriate of potash, the standard grade (50 per cent. K₂O), can be mined and delivered

at the seaboard of this country for \$15 a ton and show a handsome profit. I am told that it was stated in debate in the Reichstag in 1910 that the best mines in Germany could mine the mineral and refine it for about \$8 a ton. The price in cargo lots is from \$33 to \$34 per ton delivered at seaboard. Through the German Kali Syndicate the production of the mines is limited by allotment and the price is arbitrarily fixed. It is stated that there have been more than a hundred well-equipped mines, with a capacity equal to six times the world's consumption."

Only those who have experimented with the process of deriving potash salts from the silicate rocks and minerals on a large scale are in a position to speak with authority on costs, and not much has been published on this phase of the work. A. S. Cushman and G. W. Coggeshall have discussed costs and estimate at \$28.80 per ton the cost of potassium chloride of 80 per cent. grade (50 per cent. K_2O). This corresponds to a cost of 2.88 cents per lb. of K_2O . If German potassium chloride of the 80 per cent. grade can be delivered at our seaboard for \$15 per ton and show a handsome profit, the hope for the successful establishment of a domestic potash-salts industry near the Atlantic seaboard, except during abnormal times like the present, seems rather remote. The farther inland and the higher the freight rates the better the opportunity for a domestic industry to compete; but the fact must be borne in mind that the largest domestic consumption of potash salts is in the Eastern and Southeastern States, where freight rates from seaboard cities to inland points are not high.

In the preparation of soluble potash salts from the silicate rocks, especially for the fertilizer trade, which consumes more than 90 per cent. of the imported material, the problem is not necessarily one of extraction of the pure salts, though the demand for these is acute in certain branches of the chemical industry. If the potash is rendered soluble in the mass, this mass can be used in mixed fertilizers. A product, however, of too low grade will not be in demand when conditions are normal, for the trade in German potash has resulted in a demand for the higher grades.

A fact worthy of serious consideration is that most of the processes devised will yield by-products of value; indeed, the obtaining of a by-product of value may be the determining factor between profit and loss in practically all of them.

A NICKEL DEPOSIT IN CALIFORNIA.

In a bulletin published by the U. S. Geological Survey, Mr. F. C. Calkins says of the nickel deposit in California, which he examined last December:

The deposit is the property of the Friday Copper Mining Co., in which Beecher Sterne, of San Diego, is one of the principal owners. It lies near the main highway about four miles south of Julian, a village about 60 miles northeast of San Diego, with which Julian is connected by two or three automobile stage lines.

The Friday claim was located about 30 years ago, in the belief that it contained a vein of copper, and owing to the slowness with which development went forward the nickeliferous character of the ore was not discovered for some years. It is worth remarking that the famous Copper Cliff mine at Sudbury, Ontario, and the Gap mine, in Lancaster county, Pa., had in this respect a similar history. The workings at present consist of a shaft about 250 ft. deep and several drifts. The drifts

at about 200 and 250 ft. from the surface are each about 200 ft. long; the others, which are shorter, are blocked by rock falls.

The ore of the Friday property consists mainly of pyrrhotite, but contains pyrite, chalcopyrite, and an iron-nickel sulphide, and is accompanied by small quantities of amphibole and of a carbonate that is probably calcite. When the ore is viewed with the naked eye, pyrrhotite alone is conspicuous.

The fresh sulphides were found only at considerable depth below the surface. The outcrop of the vein is a spongy gossan, consisting chiefly of limonite, and a small amount of material rich in malachite was found between this and the unoxidized ore. Oxidation, which is perhaps especially favored by the closely spaced partings in the pyrrhotite, attacks vigorously the ore thrown on the dump and develops enough heat to char wood. Its chief products, in the first stage, are sulphates, which are readily dissolved, so that much of the nickel and copper must have been lost from the accumulated ore.

The ore can not be said to have a gangue in the proper sense of the term. The minerals intimately mingled with the sulphides are almost negligible in quantity, though the ore is more or less mingled with country rock at the margins.

No assays or chemical analyses of the ore have been made by the Geological Survey, but several have been supplied by the company. These, on their face, indicate a wide variation in the nickel content, the percentages reported ranging from 2.94 to 22.95. The higher figures, however, are not confirmed by the appearance of the ore that was examined. It seems, on the other hand, as if considerable reliance might be placed on the figures given in two fairly detailed analyses by well-known eastern firms, namely, 4.34 and 4.12 per cent. Both these analyses report gold and silver to be absent, though the assays giving the highest figures for nickel report them as present in weighable amounts. Copper, according to the assays, ranges from a trace to 2.4 per cent. Platinum, whose possible presence in traces at least is suggested by the geologic relations of the ore, apparently has not been looked for.

Regarding the form of the ore body, and its detailed relations to the country rock, only partial evidence was gathered by examination of the one accessible drift in which the ore is exposed. The observations indicate that the ore forms a chimney-like body of steep inclination, partly bounded by slips. The mass does not appear to be sharply defined except where there is indication that it is faulted. It lies near the contact of gabbro and schist, but is partly enclosed in gabbro.

PROSPECTING FOR NICKEL.

The E. J. Longyear Co. has during the summer been carrying on a diamond drilling campaign in the Sudbury district. It is reported that some good ore has been encountered on claims east of the Garson mine. The extent of the deposits is as yet unknown.

The company is spending a large sum of money in its attempt to find ore, and it is to be hoped that important deposits will be found.

The E. J. Longyear Co. of Minneapolis, Minn., are exploring engineers and geologists, diamond drill contractors and manufacturers of diamond drills and supplies. We have not been advised whether the prospecting campaign now under way in the Sudbury district is on behalf of the Longyear company or under contract with other interests.

THE "SNEER" ZONE.

The "Toronto World" on Sept. 24 printed the following:

The graduating class of a mining college decided to spend the summer prospecting in order to gain practical experience. They went to a well-known mining engineer for advice, a man who is both optimistic and conservative.

"Where had we better go to prospect?" they asked.

"Well, I'll tell you the most likely place. Go into the 'sneer zone' round any established mining camp. Every camp has its 'sneer zone.' It is the place where all the wise miners and engineers refuse to look for mineral, and insist that nobody but a fool would expect to find anything. The 'sneer zone' is virgin territory, and you'll have as good a chance there as in any place, and usually better."

As a gold mining field Canada was all in the "sneer zone" a few years ago. Very rich placers had been worked, first in British Columbia, and later in the Klondike, but lode mining had been for the most part a dismal failure. There was not a single mine of the front rank in the whole Dominion. (What about Rossland and Hedley?). Now we have at Porcupine one mine paying 13 per cent. per annum on an issued capital of \$24,000,000, and when the enlargements of the plant are completed the earnings will be over 20 per cent.

The Croesus, in Munro, was hawked about Toronto for over a year, and turned down by more than one gentleman "from Missouri." The ore was too dazzling. Mining engineers are accustomed to seeing more quartz than gold, and values of \$40,000 per ton left little room for gangue or waste. But eventually a venturesome buyer paid \$75,000 for the property, and now there is \$3,000,000 in sight. The mine has produced some of the richest samples ever seen in Canada. Imagine the feelings of the "Missourians" who relegated this wonderful property to the "sneer zone."

In the early days at Cobalt the Crown Reserve was in the discard; in fact, totally eclipsed by the glamor of the "silver sidewalk" on the Lawson. The \$1 shares could not be marketed at 10 cents each. But underneath the mud and water of Kerr lake, within a stone's throw of the spectacular outcrop on the Lawson, there was \$10,000,000 in silver in the Carson vein 200 feet from the surface. This was the great bonanza of Cobalt. When discovered the shares went over \$5, and several fortunes were made over night. The Lawson was famous over half a continent. Even the men "from Missouri" were convinced of its richness, but its production has been only a tenth of the Carson vein.

It is, therefore, plain that mining experts sometimes make mistakes, and the precious metals are occasionally found in unexpected places. A property is not necessarily worthless because it has been abandoned. Even in the Sudbury nickel field properties have been examined and rejected by supposedly competent experts a dozen times. Hardly any two mining regions or any two properties in any region are exactly alike, therefore, it is unwise to sneer.

Often failures have resulted because work was done in the wrong place, or in an unskilful manner. In fact, there has been a great deal of perfunctory mining without proof that the properties operated are either good or bad. Much more capital is required, but that is assured after the war, and large capital is generally combined with skill. Owing to the wide pre-Cambrian

area in Canada there is a great future for the mining industry.

DOMES MINES.

The report of Dome Mines, Ltd., for the month of August shows that there was milled 40,010 tons ore. The bullion produced is valued at \$180,000. The cost was \$2.56 per ton, made up as follows: mining, 75 cents; development, 60 cents; milling, 81 cents; general, 31 cents.

September is expected to show a large tonnage milled. In spite of the fact that the grade of ore is low, the company is accumulating a surplus while paying regular dividends.

BOOK REVIEWS.

The Flotation Process—by Herbert A. Megraw—McGraw-Hill Book Co., New York—Price \$2.50—For Sale by Book Department, Canadian Mining Journal.

In this book Mr. Megraw presents information gathered from his practice and consultation, which is a valuable contribution to the literature on the flotation process. An endeavor has been made to state the known facts rather than to speculate on them.

The chapter headings are: Concentration by flotation, patent record, theory, oils and their uses, processes and apparatus, testing ores, testing at Anaconda mill, applications, examples of practice, operating plants, concentration at Anaconda, practice and place in metallurgy.

Mr. Megraw defines flotation concentration as "the taking advantage of the principles of surface tension and colloid chemistry, with whatever allied principles may be involved, to separate mineral from gangue by means of floating it upon the surface of water or other solutions, while the gangue is induced to sink through the surface and settle separately."

The way in which the principles referred to may be utilized is the metallurgist's problem. Mr. Megraw helps in this little book to point out the way.

The American Petroleum Industry—by Raymond Foss Bacon and William Allen Hamor—with Special Chapters by F. G. Clapp, Roswell H. Johnson, J. P. Cappeau and L. G. Huntley—McGraw-Hill Book Co., New York—Price \$10.00—For Sale by Book Department, Canadian Mining Journal.

This excellent treatise is a very welcome one, for good books on the American Petroleum Industry are scarce. The work is a comprehensive one of 963 pages, published in two volumes. The authors are the director and the assistant director of the Mellon Institute at Pittsburgh.

The chapter headings of Volume I. are: Geochemistry, geology, distribution in United States, physical and chemical properties, history of the industry, oil well technology, valuation of properties, commercial factors involved in appraisal, causes of decline of wells, efficiency in production, condensation of gasoline from natural gas.

In Volume II. the chapter headings are: Refinery technology, engineering, hygienic considerations, some problems of the industry, the shale-oil industry, glossary of bitumenology.

The authors have endeavored to present a comprehensive survey of the American petroleum industry. This was a tremendous task, but has been successfully accomplished, and the volumes may be consulted profitably by anyone interested in petroleum.

PERSONAL AND GENERAL

Mr. Ralph Scott, formerly of the Dome mine staff, is now manager of the feldspar mine at Verona, Ont.

Mr. C. H. Hitchcock is in The Pas district, Manitoba.

Mr. Geo. T. Holloway and Mr. T. W. Gibson, of the Ontario Nickel Commission, have been at Sudbury and Cobalt this week holding public meetings for discussion of the nickel problem.

Mr. R. W. Atwater, of New York City, consulting engineer for Ladenburg-Thalman & Co., has been on a professional visit to the Coeur d'Alene district, Idaho. Years ago he was manager of the Ymir gold mine in British Columbia.

Mr. Geo. H. Aylard, of Victoria, B. C., general manager of the Standard Silver-Lead Mining Co., operating near Silverton, Slocan, was in the Bridge River region, Lillooet district of British Columbia, last month looking at some lode-gold properties.

Mr. H. C. Bellinger, a metallurgist well known in British Columbia, recently spent a short vacation with his family on his farm near Kiesling, Northeastern Washington. He has since proceeded to New York City, en route to Chile, in which last-mentioned country he has charge of the smelting works and metallurgical operations of the Guggenheim Exploration Co.

Mr. J. Edward Berg is manager of the Pueblo mine, in Whitehorse copper camp, Southern Yukon.

Mr. W. A. Carlyle was at Butte, Montana, in the early part of September.

Mr. Henry Clark, Canadian manager for Head, Wrightson & Co., of Stockton-on-Tees, England, bridge and mining machinery manufacturers, left Victoria, British Columbia, early last month to proceed to the firm's headquarters in England on business.

Mr. A. C. Garde, formerly manager of the Payne mine, in Slocan district of British Columbia, and for several recent years having his headquarters at Prince Rupert, the western terminus of the Grand Trunk Pacific railway, left the latter place on September 5th for Smithers, in Omineca division and near the railway, to take charge of the development of a mining property on which the occurrence of silver-lead and antimony ore has been reported.

Mr. Wm. Gardner, of London, England, secretary of the Tyee Copper Co., is at Ladysmith, Vancouver island, B. C., in connection with efforts being made to arrange for a resumption of smelting operations at the company's copper smeltery at Ladysmith.

Messrs. G. H. Garry and R. J. King, of the Tonopah-Belmont Co.'s mining engineering staff, were at Prince Rupert last month, having been investigating the mining situation in parts of British Columbia tributary to that town.

Mr. J. Cleveland Haas, of Spokane, Washington, consulting engineer to a company that is engaged in developing a group of mineral claims situated near Ainsworth, B. C., was on the property in the latter part of August, ascertaining progress and advising as to further development work. Mr. W. A. Harvey, a Slocan district old-timer, is resident superintendent.

Mr. Chas. Hussey, of Spokane, at the head of the business department of the Standard Silver-Lead Mining Co., after having spent a three weeks' vacation motoring in the Yellowstone Park and other parts of Montana, recently went to the company's mine, near Slocan lake, B. C., where the latest important development reported was the opening of a big shoot of galena ore on the Alpha claims of the large group owned by the company.

Mr. H. H. Johnstone, for some years head underground boss in the Consolidated Mining and Smelting Co.'s Centre Star-War Eagle group of mines at Rossland, B. C., after having for the last three months been acting district inspector of mines during the absence on sick leave of Inspector Jas. McGregor, has been added to the permanent mine-inspection staff of the British Columbia Department of Mines, the considerable increase in metal mining in Kootenay and Boundary districts making the services of another mine inspector necessary.

Mr. Arthur Lakes, Jr., of Spokane, Washington, last month paid a visit to the Bayonne region, in the south-eastern part of Nelson mining division of British Columbia, in which is situated the Spokane group of mineral claims, owned by Laib Bros., who have during the last two months been sending out gold-silver ore nine miles by pack train and eleven miles thence by wagon to the Nelson-Spokane railway at Salmo. Mr. W. R. Salisbury, of Salmo, who formerly leased the Hudson Bay zinc mine and shipped much ore from it to the United States, has arranged to continue the development of the Spokane group under an option of purchase.

Mr. A. G. Larson recently returned to his headquarters at Spokane from a trip to Colorado and other parts of the United States, during which he gave attention to the business of finding a market for concentrate from the Lucky Jim zinc mine, in Slocan district of British Columbia, which for nearly a year has been operated profitably under his direction.

Mr. C. O. Lindberg, of Los Angeles, California, has been investigating the zinc ore resources of Kootenay district of British Columbia, and obtaining information relative to the smelting or other reduction of zinc ores in that district.

Mr. J. F. McKenzie, of the International Molybdenum Co., of Renfrew, Ontario, has been examining the Molly molybdenite mine, on Lost creek, Nelson mining division, British Columbia, on which 16 men are employed doing development work, with Mr. J. R. Rutherford in charge.

Mr. E. J. Montgomery, assistant superintendent of the Centre Star-War Eagle mines, Rossland, B. C., left that place early in September for a holiday visit to Montreal, Quebec.

Mr. Robert Musgrave, of Victoria, B. C., was in East Kootenay district last month, investigating a number of mining properties for the British Columbia Department of Mines. He is expected to shortly visit mining camps in the Hope and 23-mile region of Yale district.

Mr. Fred. S. Peters, superintendent of the Le Roi mine, left Rossland, B. C., on September 11th to pay a visit to his old home in Nova Scotia.

Mr. M. E. Purcell, superintendent of the Centre Star-War Eagle group of mines at Rossland, B. C., a short time ago spent several days in the Coeur d'Alene district, Idaho, and while there visited some of the larger silver-lead and zinc mines which are being energetically and profitably operated.

Mr. J. V. Richards, of Spokane, recently examined a mining property near the northern end of Kootenay lake, British Columbia, for a prospective purchaser from that city.

Mr. W. Fleet Robertson, of Victoria, B. C., provincial mineralogist, was in Lillooet district during the first part of September, examining mining properties in country about Bridge river.

Mr. F. H. Skeels is manager of the Kootenay Gold Exploration Co., the organizers of which a few weeks

ago acquired the Granite-Poorman group of gold mines, near Nelson, British Columbia.

Mr. Trevor W. Starkey, of Nelson, B. C., has been on a five weeks' trip through the Lardeau and Upper Duncan regions of West Kootenay, examining mining properties for United States men.

Mr. F. M. Sylvester, general manager for the Granby Consolidated M., S. & P. Co., was recently on a visit to Spokane, Washington, where he resided for some time prior to his removal to Vancouver, B. C.

Mr. D. J. Williams, manager for the Rocher Deboile Copper Co., near New Hazelton, Omineca mining division, British Columbia, was at Edmonton, Alberta, last month.

Mr. Chas. H. Young, of the Geological Survey of Canada, was at Lillooet, British Columbia, in the last week in August.

Mr. Will Haylmore, superintendent at the Coronation gold mine, on Cadwallader creek, in the Bridge River section of Lillooet district, British Columbia, has joined the 6th Field company, Canadian Engineers, for service overseas.

Mr. J. M. Williams, manager of the McGillivray Mountain Mines, Ltd., in Lillooet district, British Columbia, reported lately that much development work was being done on mining properties and that another vein of copper ore had been found.

Mr. Frank M. Estes, who has been representative in the northwest of the American Smelting and Refining Co., with headquarters at Spokane, Washington, left that city on September 12th for New York, on his way to Chile, where he is to be South American manager for the same company. His successor at Spokane is Mr. Preston Locke.

KITCHENER'S WARNING.

In every man's life there is one supreme hour towards which all earlier experience moves and from which all future results may be reckoned. For every individual Briton . . . that solemn hour is now striking.

These words, uttered by Lord Kitchener, not long before he made the last great sacrifice for Britain's sake, apply not only to those who are able to take up arms and those who can directly assist in maintaining our divisions on the firing line, but as well to those whose opportunity it is to lay, broad and deep, the foundations of the national economic structure which must be built up after the war. We cannot raise a worthy and enduring building on hastily made or inadequately planned foundations. We must plan now; we must "get our footings" now on the bed-rock of sound principles and thorough organization.

The Bannockburn property, in the upper Duncan river region, an outlying part of Ainsworth mining division, in the northwestern part, has been bonded by St. Paul men, who in August sent in six or seven men to do necessary preliminary work, such as surface stripping, camp construction, etc. The trail from the Red Elephant to the Bannockburn has been put in order, but transportation facilities are insufficient to admit of much mining work being done during the remainder of this season.

The first car of ore from Messrs. Brown & Jordan's claims was shipped from Keremeos, in the Similkameen valley, on August 28th. It was consigned to the Granby Consolidated Co.'s smelting works on Grand Forks, Boundary district.

A strike of copper ore in the Babine country, Omineca mining division, 23 miles from Hazelton, has been reported, but no particulars have been published.

SPECIAL CORRESPONDENCE

COBALT

Little Nipissing.

There is some possibility that the old leases ground of the Little Nipissing from Peterson Lake may prove one of the so-called "come-backs" of the camp. About a month ago, what is known locally as the Detroit Syndicate, took over this ground, which is better described as being the northern portion of the Peterson Lake property. A start was made at once in de-watering the old workings to the 155 ft. level. This work is now about completed, and the task was a heavy one, as the flow from the old Peterson Lake workings, those of the Seneca Superior from No. 1 shaft, and the Little Nipissing property were all connected and extended nearly a mile in length. Once the water is clear to the 155 ft. level, however, a cement bulkhead will be put in, and the leased ground cut off from the other. An examination of the old workings showed considerable low grade ore in the stope at the 100 ft. level. An assay made across the stope at one gave 106 oz. to the ton. A few samples of high grade were found about 50 ft. from the surface. It is expected that a considerable tonnage of this low grade rock can be taken out and milled at a profit.

Red Jacket.

About two months ago a syndicate of local men took a lease from the Temiskaming Mining Co. of the old property of the Red Jacket Mining Co., about two miles south of the McKinley-Darragh property. The old workings were accordingly pumped out and an examination made. The engineers who made the examination, however, did not report favorably upon the property, and the idea of carrying out the plan of exploration outlined was dropped. The workings are now almost full of water again.

Calumet and Montana.

The Calumet and Montana Consolidated, which has a lease on the old Cyril Lake property, is pushing a crosscut at the 90 ft. level of the present workings to cut the extension of what was known as the Bilsky vein on the old Nova Scotia property. The undertaking requires about 250 ft. or more of crosscutting, but more than half of this has been completed now. On the 50 ft. level the company got some high grade ore and some mill rock was cut through, which it is thought can be milled at a profit.

Chambers-Ferland.

Chambers-Ferland will have another carload of high grade ore assembled for shipment about the first of October. The company estimates that there is at present in sight about 10,000 tons of low grade ore and mill rock. Shipments of this will be started to the Northern Customs concentrator as soon as the latter company is ready to receive it. A contract has already been made with the latter company. Underground a crosscut is being run to connect up all of the winze work, and in the progress of crosscutting the extension of the Nipissing No. 64 vein will be cut through by about the first of next month. This vein was cut on one of the upper levels last winter, but as this was not in the ore horizon it was not a disappointment to

the company when no values were found. On the 425 ft. level the company is mining high grade in the new veins found last winter, and there is reason to hope for good results on the No. 64 vein at the same level.

NOVA SCOTIA

Dominion Coal Outputs.—The monthly production of the Dominion Coal Co.'s collieries compares with 1915 as follows:

	1915.	1916.
January.	287,000	407,000
February.	312,000	396,000
March.	364,000	411,000
April.	357,000	378,000
May.	472,000	383,000
June.	481,000	365,000
July.	498,000	360,000
August.	443,000	352,000
September.	452,000	*345,000
	3,666,000	3,397,000

*Estimated.

Decrease of 269,000 tons.

It will be noticed that every month this summer has shown a decline from the preceding month, and the tendency is still in a falling direction. It appears probable that the output for the year will total about 4,100,000 tons, or 500,000 tons below the production of 1915, notwithstanding that up to the end of the half-year the production figures were well in advance of those of 1915. During the five summer months, May to September inclusive, it will be seen that the outputs have fallen below those of the corresponding months of 1915 by no less than 541,000 tons, and if an estimate is made of the falling-off that may be anticipated for the period, October to December inclusive, the total drop below the 1915 capacity will be in the neighborhood of 900,000 tons. Shortage of men is the sole reason for the decline, and enlistments is the chief and practically the only reason for the shortage of men.

The Need of Men.

The shipment of Nova Scotia coal to St. Lawrence ports is this year badly affected by the decreased production of coal in the province. The actual shipments this season will be less than one-quarter the normal tonnage, and less than in any year since about 1894. When, very recently, a national strike of railwaymen was threatened in the United States, it was stated that Ontario had about one month's coal supply on hand, and some newspapers sought to allay popular anxiety on the score of coal supply, by intimating that it would be possible to bring in coal from the Maritime Provinces to replace the shortage in United States importations. How little there is in this possibility the foregoing facts and figures will show very plainly.

On several occasions your correspondent has pointed out the dangers from a national point of view of allowing the working forces at the collieries in Nova Scotia to be depleted, and the unwisdom of allowing Canada to become too wholly dependent on the United States for coal supply. There is no parallel in any of the belligerent countries, on either side, of so great a decline in coal production as has been allowed to take place in Nova Scotia since the commencement of the war. On the contrary, every effort has been made by the governments at war to increase the production of

coal, particularly bituminous coal, because, as has been pointed out in these columns in almost monotonous reiteration, it is the basic munition of war.

So little is the need for coal realized, however, that during August somewhere in the vicinity of 1,800 men left the Maritime Provinces to harvest in the West. At least 800 of these men were taken from the mines and munitions plants of Nova Scotia, and a great many of these men were carried out of Nova Scotia on the Government railroad. The rate quoted to harvest excursioners is so low as to be practically a subsidized rate, and it cannot be denied that such a wholesale movement of men at cheap rates on Government-owned and Government subsidized railroads places the responsibility for the movement upon the Government itself. When, after allowing the working forces at the mines to be depleted by recruiting to the extent indicated by the falling off in production previously referred to, the Government allow a further depletion of the workers by sanctioning harvest excursions from Nova Scotia, it is impossible to escape the conclusion that the authorities do not realize the necessity of coal at the present juncture.

BRITISH COLUMBIA

Dividend payments by mining companies operating in British Columbia are expected to total about \$3,500,000 for 1916 as compared with \$3,276,151 for 1914 and 1915 combined. Payments to October 1st, which will include the recently declared dividend of the Consolidated Mining and Smelting Co. and that of the Hedley Gold Mining Co. for the third quarter of the year, which latter is expected to be announced before the end of September, will total \$2,405,000, with a possible addition not yet made public.

Two small shipments of ore have been received at Trail lately from Port Arthur, Ontario. While the quantity is not large, it is noteworthy that even two or three carloads of ore should have been sent such a long distance to western reduction works.

While it is yet too early for particulars of the season's yield of placer-gold in the province to be ascertained, it is of interest to know that the outlook is favorable for an average total in value. Some notes on mining in Cariboo and Atlin districts follow.

Cariboo.

Drilling operations have been resumed in gravel beds in the neighborhood of Barkerville, with the object of ascertaining whether the quantity of gravel and its gold content are such as to warrant the establishment there of a gold-dredging enterprise. Mr. John T. Towers, who is stated to represent Boston capitalists, operated a Keystone drill on Williams creek and Willow river in the seasons of both 1914 and 1915. In his annual report for the latter year the district Gold Commissioner said: "J. T. Towers operated his drill on Willow river in the vicinity of Mosquito and Cornish creeks, and on the lower Willow river below Slough creek. For reasons needless to mention, the results of the drilling are not made public; however, I do not think that they were discouraging, and feel fairly confident that they proved there is a considerable yardage of dredging ground in these parts." Another drill was also operated last year, by the Yukon Gold Co., first on Antler creek, then on Williams creek, afterward on Willow river, and still later on Lightning creek. Concerning the work done with this drill, the Gold Commissioner reported, in part: "The first cross section was drilled practically over the upper line of the old

Tinker and Cameron claims, two of the richest claims in the old days. It was out of these two claims that the late 'Cariboo Cameron' took so many thousands of dollars in the early days." Other cross sections were also obtained in the neighborhood of Barkerville.

Atlin.

The Daily Alaskan, published at Skagway, through which port travel to and from Atlin passes, a few weeks ago, included in its comments the following reference to Atlin: "We are happy to learn that Atlin and the interior are building a good solid foundation for business, and that mining is forging to the front in that part of the country."

When in Skagway at the end of August, Mr. J. M. Ruffner, a pioneer mining operator in Atlin district, where for years he was manager for the North Columbia Gold Mining Co., one of the largest gold-producers in that region, told the Daily Alaskan that things are moving in the Atlin district; the town of Atlin, which was nearly destroyed by fire last spring, is being rebuilt, and a general tone of prosperity seems to have settled over the camp. Mr. Ruffner himself had been operating a hydraulic property at the head of Spruce creek, but a shortage of water for sluicing had necessitated his suspending gravel washing for this season. From a drift mine he is operating on lower Spruce creek he is getting good pay.

The Engineer lode-gold mine, Mr. Ruffner said, continues to produce good ore, and indications point to a maintenance of activity at that mine. Prospectors are working in various parts of the Atlin district and finds of ore are reported from time to time. A shortage of labor has prevented more progress being made in some of the mining camps, in which higher wages are being paid than ever before. Plenty of work can be found by miners, if they are good workers and willing to buckle into the game. While most of the surface mines will be closed during the winter, a number of drift mines will be worked throughout the cold-weather season. Altogether, Atlin district is enjoying one of the best seasons it has ever experienced.

Omineca.

The Silver Standard Mining Co. is stated to have shipped six cars of zinc ore to the Kusa Spelter Co., Oklahoma, the net receipts for which are given as having been \$8,700. Receipts of silver-lead ore from this company's mine on Glen mountain, a few miles from Hazelton, at the Consolidated M. & S. Co.'s works at Trail in 1916 to the end of August have been 448 tons. An idea of the average metal contents of ore from this mine can be obtained from its shipments in 1914, when 736 tons gave a return of approximately 200 oz. gold, 122,000 oz. silver, and 282,000 lb. lead.

The Omineca Herald quotes Supt. D. J. Williams, of the Rocher Deboule Copper Co., operating on Rocher Deboule mountain, at the head of Juniper creek, about ten miles from Skeena crossing on the Grand Trunk Pacific railway, to the effect that the company has about 3,000 tons of ore tied up owing to lack of transportation facilities, both railway to the coast and shipping thence to a smelter. This year ore has been going to the smelting works near Tacoma, Puget sound, Washington. The published official report for last year stated that the company's mine, then under lease to the Montana Continental Development Co., from May 17th to December 12th, inclusive, shipped to the Granby Consolidated Co.'s smelting works at Anyox 17,000 tons of ore averaging about 8 per cent. copper and \$1.65 gold and 50 cents silver to the ton. Buildings

erected, machinery and plant installations then completed, and other improvements then consisted of a two-story bunkhouse accommodating 96 men, steam-heated and electric-lighted, with two large reading-rooms and two rooms for drying clothes, the latter supplied with shower baths for men's use; a compressor-building and machine-shop; a 175-h.p. distillate engine for use in connection with water-supply purposes in the winter; an electric hoist to take men and supplies from camp to mine; a steam locomotive to haul ore from mine to upper terminal of the aerial tramway; laundry and mine and office buildings, etc. In the mine much development work had been done, and preparations were being made for sinking to the 500-ft. level.

West Kootenay.

Ainsworth—Shipments of ore from the Consolidated Mining and Smelting Co.'s Highland mine were larger in August than from all other mines in the division combined. The Comfort lead mine, on the east side of Kootenay lake, shipped 137 tons; the Florence Mining Co.'s Hope mine, 84 tons; the Utica, 142 tons, and several small lots together made up 58 tons. Against these the total from the Highland was 441 tons. No ore was shipped from the Bluebell during two months, but it is expected shipment will shortly be resumed, repairs and renewals to the water-supply line, damaged during June by floods, having been completed.

Slocan—Shippers of silver-lead ore from this division are the Galena Farm, Hewitt, Idaho-Alamo, Lucky Thought, Lucky Jim, No. 1, Rambler-Cariboo, Slocan Star, Standard, and Wonderful. Several mines have also shipped zinc ore, but that has been consigned to smelting works in the United States. The Black Prince, and Enterprise, in Slocan City division, also shipped ore to Trail. Generally, mining is progressive in the Slocan, and prospects appear to be favorable for further improvement. An endeavor is being made to organize a company to acquire and operate the Galena Farm, near Silverton, Slocan lake, which since last autumn has been energetically and profitably worked by the estate of the late Patrick Clark, of Spokane, Washington. It is reported that a big shoot of ore has been opened in the Alpha property of the Standard Silver-Lead Mining Co.'s group, above Silverton, and important developments are expected.

Nelson.—Customs receipts at the port of Nelson during the month of August were \$15,193, which total was about \$2,296 higher than that for July. According to the statements of officials, the increase was due chiefly to the fact that much mining machinery, required for the equipment of mines in Kootenay district, was received during August. Further, it is claimed that mining equipment has been coming in to the district in increasing quantity ever since last spring.

SILVER PRICES.

September—	New York, cents.	London, pence.
9th.	68¾	32½
11.	68	32¾
12.	67¾	32½
13.	68	32¾
14.	68¼	32½
15.	68	32¾
18.	68¾	32½
19.	68¾	32¾
21.	68¾	32¾
22.	68¾	32¾

MARKETS

TORONTO MARKETS.

Sept. 25—(Quotations from Canada Metal Co., Toronto)—

Spelter, 12½ cents per lb.
 Lead, 9 cents per lb.
 Tin, 44 cents per lb.
 Antimony, 18 cents per lb.
 Copper, casting, 29 cents per lb.
 Electrolytic, 31 cents per lb.
 Ingot brass, yellow, 17½ cents; red, 20½ cents per lb.

Sept. 25—(Quotations from Elias Rogers Co., Toronto)—

Coal, anthracite, \$8.50 per ton.
 Coal, bituminous, \$5.85 per ton.

NEW YORK MARKETS.

Sept. 22, 1916—Connellsville Coke—

Furnace, spot, \$2.85 to \$3.00.
 Furnace, contract, \$2.75.
 Foundry, prompt, \$3.25 to \$3.50.
 Foundry, contract, \$3.25 to \$3.50.

Sept. 22, 1916—Straits Tin, f.o.b., 38.60 cents.

Copper—

Prime Lake, nominal, 27.75 to 28.25 cents.
 Electrolytic, nominal, 28.25 to 28.50 cents.
 Casting, nominal, 26.12½ to 26.37½ cents.
 Lead, Trust price, 7.00 cents.
 Lead, outside, 6.97½ cents.
 Spelter, prompt western shipment, 9.17½ to 9.30 cents.

Antimony—

Chinese and Japanese, 11.00 to 11.25 cents.
 American, nominal.

Aluminum, nominal—

No. 1 virgin, 98-99 p.c., 62.00 to 63.00 cents.
 Pure, 98-99 remelt, 61.00 to 62.00 cents.
 No. 12 alloy remelt, 48.00 to 49.00 cents.
 Powdered aluminum, \$1.00 to \$1.15.

Metallic magnesium, 99 p.c. plus, \$4.00.

Nickel, shot and ingot, 45.00 cents.

Electrolytic, 50.00 cents.

Cadmium, nominal, \$1.45 to \$1.50.

Quicksilver, \$73.00 to \$74.00.

Platinum, \$85.00.

Cobalt (metallic), \$1.25.

Silver (official), 68¾ cents.

Metal Products—Following base prices represent the outside market except where otherwise specified and are entirely nominal except in the case of lead sheets and sheet zinc:

Sheet Copper—

Hot rolled (f.o.b. mill), 37.50 cents.
 Cold rolled (f.o.b. mill), 38.50 cents.
 Copper in rods, 42.00 cents.
 Copper in rolls, 39.00 cents.
 Copper wire (f.o.b. mill), 33.00 cents.
 Copper wire (f.o.b. mill), Oct., 32.25 cents.

High Brass—

Sheets, 42.00 to 46.00 cents.
 Wire and light rods, 45.00 to 48.00 cents.
 Heavy rods, 41.00 to 45.00 cents.

Tubing—

Brazed brass, 45.00 to 50.00 cents.
 Brazed brass (f.o.b. mill), 43.75 cents.
 Seamless Copper, 46.00 to 48.00 cents.
 Seamless brass (f.o.b. mill), 46.00 to 48.00 cents.
 Full lead sheets (f.o.b. mill), 8.50 cents.
 Cut lead sheets (f.o.b. mill), 8.75 cents.
 Sheet zinc (f.o.b. smelter), 15.00 cents.

STOCK QUOTATIONS.

(Courtesy of J. P. Bickell & Co., Toronto.)

As of close Sept. 25th, 1916.

New York Curb.

	Bid.	Asked.
Atlantic Steel	80.00	85.00
Alta. Cons.	31.00	34.00
Butte	7.38	7.63
Can. Copper	11.12	11.62
Cambria Steel	82.00	83.00
Canada Cement	64.00	67.00
Con. Ariz.	1.43	1.50
Emma Copper	1.93	2.00
Howe Sound	5.00	5.25
International Petroleum	10.62	11.00
Inter. Nickel (New)	51.87	52.00
Kennecott Copper	54.62	54.75
Midvale Steel	75.62	75.75
Magma	19.62	19.75
Mother Lode	38.00	39.00

Porcupine Stocks.

	Bid.	Asked.
Davidson	.47	....
Apex	.08¾	.09
Dome Consolidated	.10½	.12
Dome Extension	.35¼	.35¾
Dome Lake	.59	.60
Dome Mines	24.75	....
Eldorado	.00¾	.00½
Foley O'Brien	.75	....
Hollinger	7.00	7.05
Homestake	.61	....
Jupiter	.29½	.30
McIntyre	1.47	1.48
McIntyre Extension	.40	.43
Moneta	.17	.18
Plenaarium	.50	.70
Porcupine Crown	....	.75
Porcupine Imperial	.03½	.03¾
Porcupine Tisdale	.01½	.02
Porcupine Vipond	.36¾	.38
Preston East Dome	.04¾	.05
New Ray	.68	.69
Teck Hughes	.38	.39½
West Dome Con.	.38	.39½

Cobalt Stocks.

	Bid.	Asked.
Adanac	.25	.32
Bailey	.09	....
Beaver	.45¾	.47
Chambers Ferland	.20	.21
Calumet and Montana	.72	.75
Coniagas	....	5.00
Crown Reserve	.58	.59
Foster	....	.07½
Gifford	.04½	.05
Gould	....	.00¾
Great Northern	.05¾	.06
Hargreaves	.03	.03½
Hudson Bay	65.00	....
Kerr Lake	4.90	4.95
La Rose	.61	.65
McKinley	.66	.67
Nipissing	8.70	8.90
Ophir	.10	.10½
Peterson Lake	.23¼	.24